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the OIL AND GAS JOURNAL

SEPTEMBER 29, 1958

CURRENT STATISTICS p. 133

25,000 ft.

Phillips sets epochal record for the industry to shoot at . . . finds Ellenburger . . . sets sights on 25,500 ft. p. 33

Why Gasoline Prices Are Soft p. 44

New Technique for—

Calculating Static Bottom-Hole Pressures p. 79

LPG storage capacity passes 42 million barrels

EXCLUSIVE IN THE JOURNAL p. 40

Field Man's Favorite

Rockwell "1600" aluminum gas meter and Rockwell "173" service regulator measuring gas engine consumption in Texas.

ROCKWELL "1600" *Aluminum* GAS METER

Easiest to handle, install, service!

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ALUMINUM GAS METERS

another fine product by

ROCKWELL

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Sept.29, 1958

Phillips has given the industry a 25,000-ft. depth record:

But important thing for oil men to remember about the well is this: It was a calculated business risk and not a big glamor project to grab headlines.

That should be the guide line for other operators who'll be tempted to drill even deeper.

Phillips officials sought natural gas in the Ellenburger. Based on success at nearby Puckett field, company put down three deep wells. Another Puckett from any of three would have justified the risks.

The record-breaker well went to 25,000 ft. only because it took that much hole to find the base Ellenburger. Testing in days ahead will tell the story on production (p. 33).

▼ ▼ ▼

The drilling industry is looking up.

Journal editors close to the industry report a feeling of optimism is beginning to return. They feel the bottom has been reached in the recent drilling doldrums.

A few straws in the wind:

...Well completions for week ending September 20 hit 1,063, the first time they've passed the 1,000 mark since last winter.

...Wildcat completions were also highest of the year, due to stepped-up activity in Illinois, Oklahoma, the Rockies.

...Wildcatting is becoming more venturesome. Operators are willing to step out a little farther, take longer chances.

...New drilling prospects are brighter in Canada, Alaska, the Rockies, on bays and inlets of Gulf Coast and in south Louisiana and Texas inland.

Not much to put your finger on yet—but the drilling trend is definitely upward.

▼ ▼ ▼

Arizona's first big oil well also is a gas producer.

Humble's 1 Navajo-E in Apache County flowed 5,900 M.c.f. per day on test at 5,250-308 ft. Earlier well flowed 40 bbl. of oil per hour from Pennsylvanian at 4,600-75 ft.

Phillips is not pulling out of Alaska despite the rumors.

Company, in fact, may add some acreage through deals in the mill. It is dropping some parcels in the Icy Bay area where three wildcats have satisfied company geologists on merits of the land.

Phillips still holds 73,000 acres in the Kenai and more on the Alaska peninsula. These holdings are still untested.

▼ ▼ ▼

Another sign oil men don't expect to quit exploring:

Nation's first college curriculum designed to turn out petroleum landmen is being offered at University of Oklahoma. American Association of Petroleum Landmen is supporting the new plan of study.

Electronic computers are destined to play increasingly important role in looking for oil.

Many studies are being made to convert electrical well-logging signals to tape or cards for computer processing. Up to now, lack of standardized records has hampered use of computers.

Move has been made by API study committee to change this. Plan is for API to serve in advisory capacity, make it possible for oil and service companies to exchange records for computer analysis.

▼ ▼ ▼

Cost cutting still is the major theme in the oil patch.

That's why engineers attending the ASME gathering in Denver took notice when two Humble men discussed a variety of new cost-cutting tools and techniques (p. 48).

Among them:

...An experimental, drag-type bit which has no bearings. It got a 110% increase in bit footage and 55% increase in penetration rate over conventional bits.

...Tubing strings in dual and triple completions which were run side by side and cemented in open hole.

...Use of oil string without casing for big saving in steel.

...Skid-mounted production unit which performs all useful functions of standard tank battery with pipeline connection.

The interest among engineers in Denver in these developments underscores the intense pressure these days from oil management for cheaper ways to do things.

▼ ▼ ▼

LPG marketers will enjoy firm prices this winter.

That's the outlook at the start of the heating season. It's backed up by two developments: A drop in stocks and an increase in underground storage capacity (p. 40).

Stocks are down 112 million gallons since last August. A late cold spell last winter pulled stocks down and manufacturers have not built them up during the summer.

Storage capacity, meanwhile, has increased by 8.6 million barrels in the last 12 months.

These developments mean that an early cold winter will put prices on the rising side. Even with a warm winter, the manufacturers can hold prices by using the extra storage.

Heavy-fuel prices are moving two ways at once to put Mid-Continent refiners in a quandary.

Posted prices for northern movement are up 10 cents per barrel, but for movement south to Gulf Coast they're down by 25 cents a barrel. It's one of few times a product has received both a price increase and cut at same time.

Other product prices:

...Gasoline market is still weak, although demand is holding up well. Some spot sales are at from one-fourth to one-half cent under published prices (p. 44).

...Distillates are showing seasonal strength. Movement now is for early fills with prices firm.

▼ ▼ ▼

Thermal stability promises to be real troublemaker in jet fuels.

Tendency of fuel to break down at high temperatures and form deposits becomes more critical with high-performance jet engines.

Refiners have developed the CFR fuel coker test to measure thermal stability as a guide to setting actual specs. Some additives also have improved thermal stability, but some actually have made problem worse because of detergent action.

Until solution is found, jet engines will be subject to frequent overhauls and high replacement rate for hot parts.

American oil investments abroad increased by $1.7 billion dollars last year. That makes total book value of this investment $9 billion.

Latin America got lion's share of U. S. dollars—$1 billion. Canada was next with $400 million. Western Europe got $200 million.

Government statistics also show domestic refiners hard hit in second quarter of this year. Sales were down to $6,112 million from $6,607 million at same time last year. Profits dropped to $503 million from $671 million the year before.

Sales of superpremium gasoline are not up to hopes.

Pattern, according to market reports, has been brisk sales at first. But when novelty wears off, the high-priced fuel suffers a sales drop.

This creates a problem for refiners. Pressure seems to be growing for a third grade. Reason is rapidly growing

spread in octane requirements within passenger car fleet. Spread between highest and lowest requirement cars in 1953 was 17 RON. Today it is 25.

▼ ▼ ▼

Look for Irish Government soon to grant concession covering all of Ireland except a small area in the north.

Concessionaires will be Ambassador Oil Corp., Fort Worth, and Rinehart & Messman, Wichita. Ambassador, with the major interest, will be operator for the two independents.

Agreement has been reached on essentially all points, the Journal learns, with only few minor bugs to be ironed out.

Ireland has never produced oil. A well reportedly has never been drilled on the island despite existence of known oil seeps.

Lake Maracaibo operators are using more aluminum.

Water in the lake in brackish, has a high concentration of oxygen. This makes it especially corrosive for ferrous metals.

Practice has been to coat, wrap, gunite, or otherwise protect pipe and structures and use reinforced concrete pilings on platforms.

Aluminum, although a newcomer, is finding favor quickly. Already 30 aluminum platforms have been installed in the lake and 20 miles of aluminum flow lines laid.

Russians report their mills are turning out 40-in. pipe for use in natural-gas trunkline systems.

New Russian equipment to lay the big pipe will include trenchers that can make a cut 82-in. deep and 49-in. wide and pipelayers capable of lifting 40 metric tons.

Use of 40-in. lines is rare. Kuwait has short sections of 38 and 40-in. line in crude service. Creole Petroleum is laying 40-in. pipe in a Lake Maracaibo gas-gathering system. But 36-in. is biggest pipe used in this country for high-pressure gas lines.

Remote control is beginning to catch on in the gas-transmission industry. Success of similar operations in oil pipelines is pointing the way.

Texas Eastern is building four remote stations in Pennsylvania after starting up a remote reciprocating station at Linden, N. J., last year. New stations will be intermediate gas-turbine centrifugal installations, operated from the downstream station.

Mark down Dallas' Love Field as the next air terminal to be served by a products pipeline.

The new connection supplanting truck deliveries, will coincide with beginning of jet flights the first of the year.

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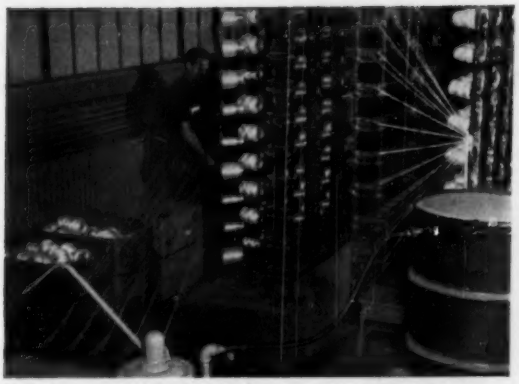
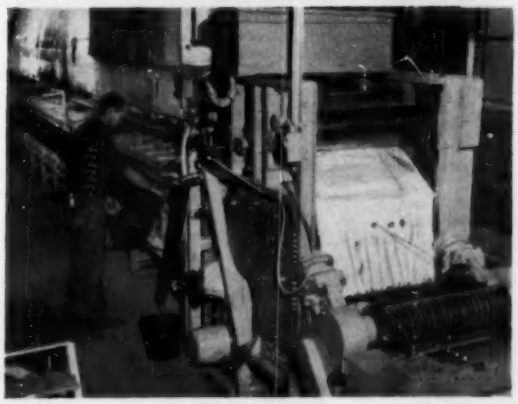
How V-Belts with the Green Seal save you money





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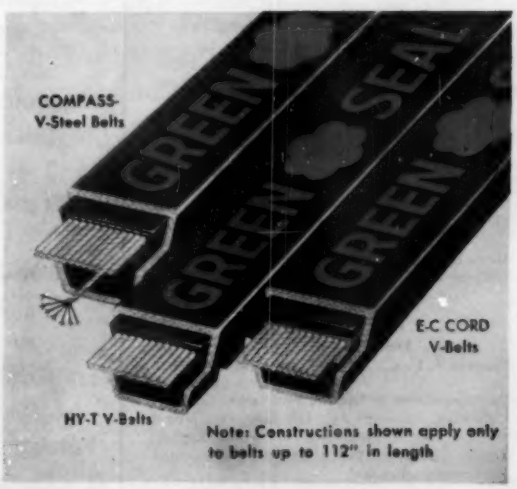

DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by

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TECHNOLOGY—OPERATION

Drilling-Production

New Blowout Preventer System 57

By Ed McGhee

Rig air operates this new light-weight, high-pressure, blowout preventer. Rams are moved by rotating the two horizontal shafts. Features are such that all blowout-prevention operations are faster and safer; no expensive high-pressure hydraulic system is necessary; and maintenance costs of blowout-prevention system is low.

75 Years of Texas Oil 70

By C. A. Warner

A table giving statistics for several selected years on well completions, production, proven reserves, pipelines and miles, and number of plants.

Modern Rig for Efficient Drilling 72

New rig just placed in service combines an old barge plus new machinery for more efficient drilling of 12¼-in. hole to 13,000 ft.

Calculating Static Bottom-Hole Pressures ... 79

By Leland L. Hurst and E. T. Guerrero

This deals with an extension of the Horner method in calculating bottom-hole pressures in a finite reservoir from buildup data. This modification provides a correlation factor that reduces the error in most cases.

Pipelining

Union Goes Automatic on New Junction-Oleum Pipeline 87

By Sam D. Taber and Leonard B. Jones

In its recently completed crude-oil pipeline, Union Oil Co. of California has incorporated several interesting design features. This is a 12 and 16-in. line, 225 miles long, for delivery of crudes and semirefined products from San Joaquin Valley producing areas and coastal area to the Oleum refinery near San Francisco.

Pipeline Construction Report 91

Refining-Processing

First Pentane-Isomerization Unit 54

By L. E. Dean, H. R. Harris, D. H. Belden, and Vladimir Haensel

The industry's first pentane-isomerization unit is a UOP Penex process designed to handle a maximum of 34,400 bbl. per day of 85% normal pentane feed and to make approximately 16,000 bbl. per day of 95% isopentane. Economics of design called for the use of four parallel reactors. Performance of the unit has justified the faith placed in the process.

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Planning a Chemical Cleaning Program 67

By Larry Resen

Cosden Petroleum Corp., at its Big Spring, Tex., refinery, uses blocked-out circulating system and a master schedule to expedite chemical cleaning of a gas-recovery unit.

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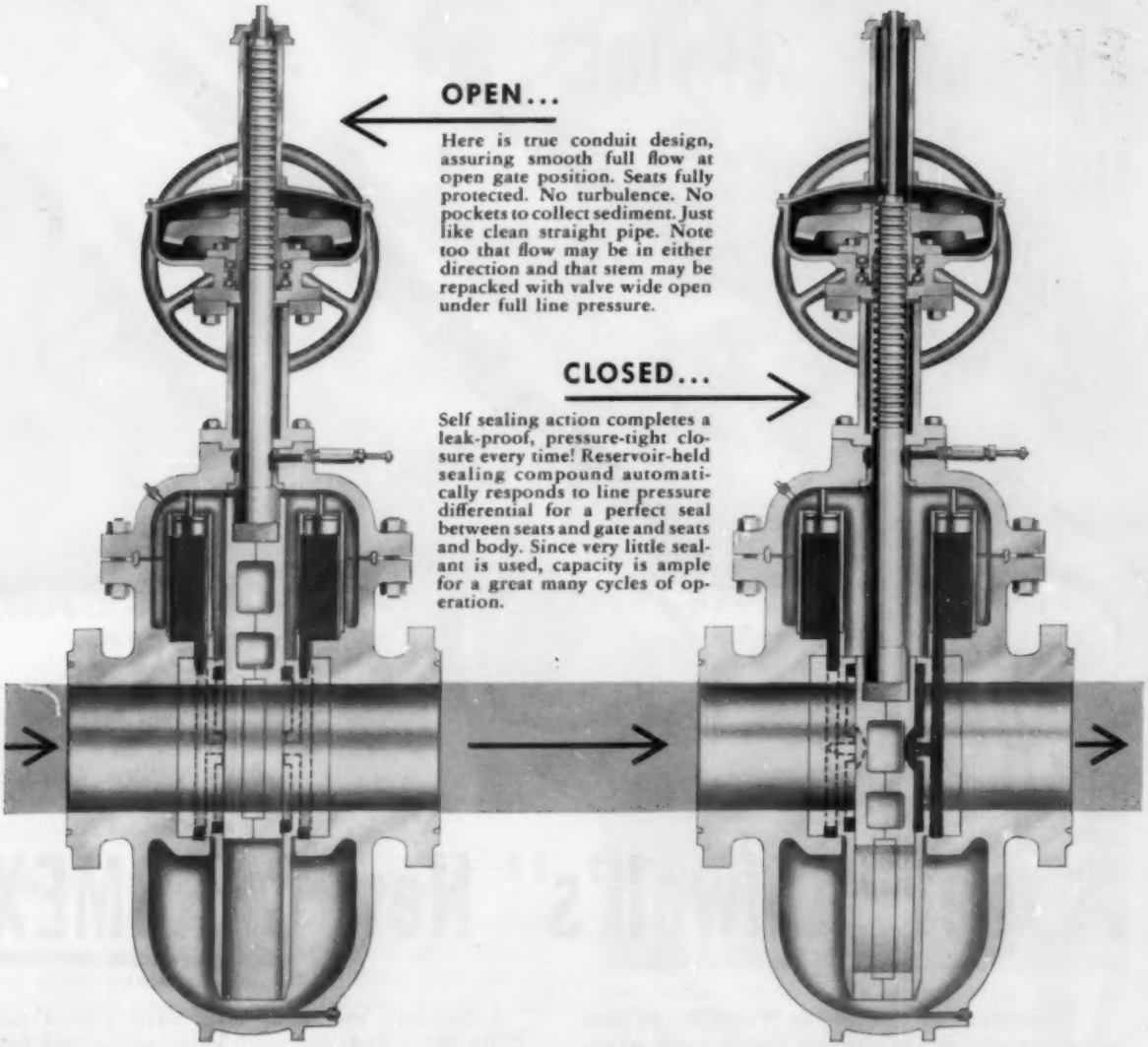

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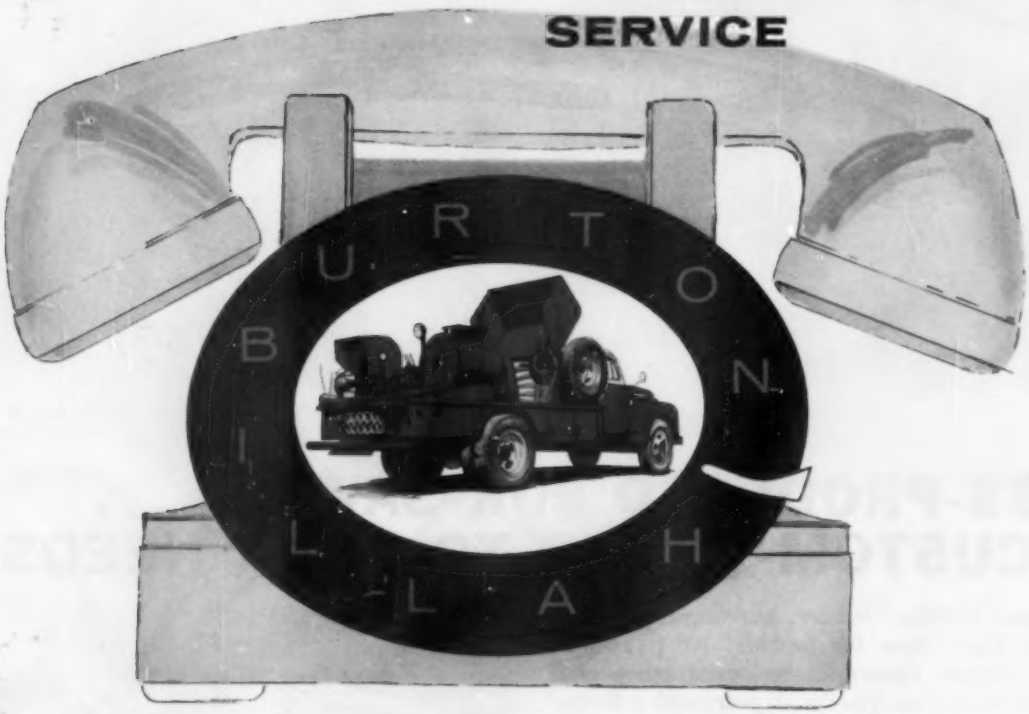

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HYDROMITE

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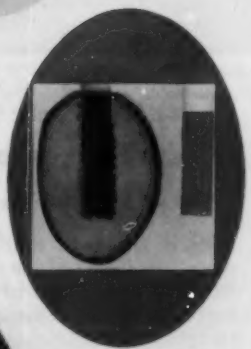
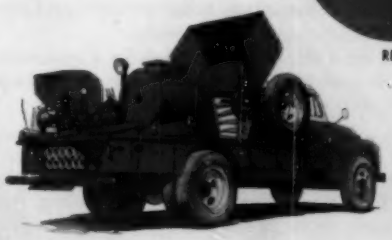


RESIN CEMENT

...a slurry composed of portland, High Early or Slo-Set Cement, water and thermo-setting resins, suitable for application in wells with temperatures ranging from 80° to 230° F. It is designed for open hole bottom plugs, setting around casing shoe or opposite water zones, and other remedial work on oil or gas wells, particularly where ordinary cementing materials fail. The set Resin-Cement is permanent in nature, is not attacked by oil, gas or salt water, and will resist the action of common acids. With these qualities, any proven plug or shut-off should be permanent and impermeable.



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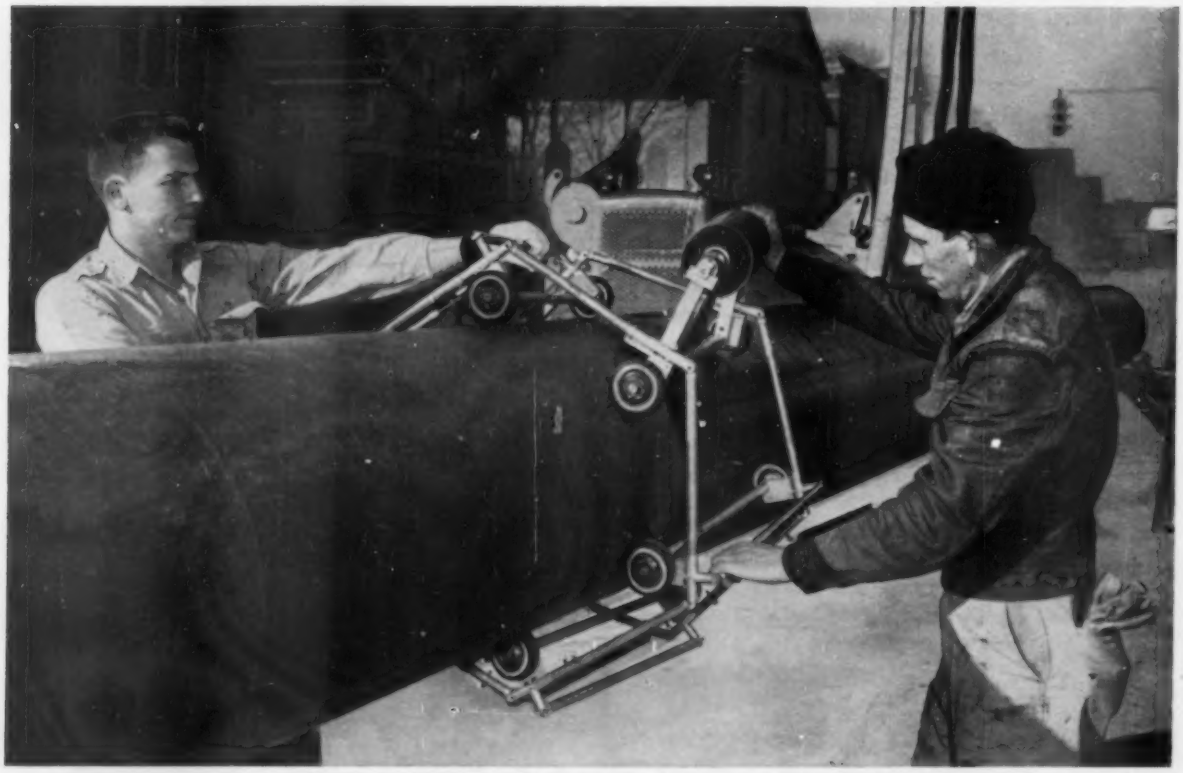
THE MODERN TAPE...AT WORK FOR MODERN INDUSTRY

20-inch gas main site-wrapped with versatile Polyken® tape



Upper New York State utility company turns to Polyken tape to get the job done fast...and sure...in congested areas

This is the tape that's making big-inch pipeline news this year. Made of tough, inert polyethylene, Polyken tape offers proven protection against the corrosive effects of moisture, soil chemicals and electrolytic current.

And here, on a site-wrapping job in a congested city area, it provides another major advantage: *simplicity of application.*

Tape saves headaches

You know the complications of using a hot coating in a place like this. Easy-to-apply Polyken tape does away with these problems. It goes on, as you see, right off the roll—without heat, liquids, solvents or thinners. Saves time, labor and equipment costs.

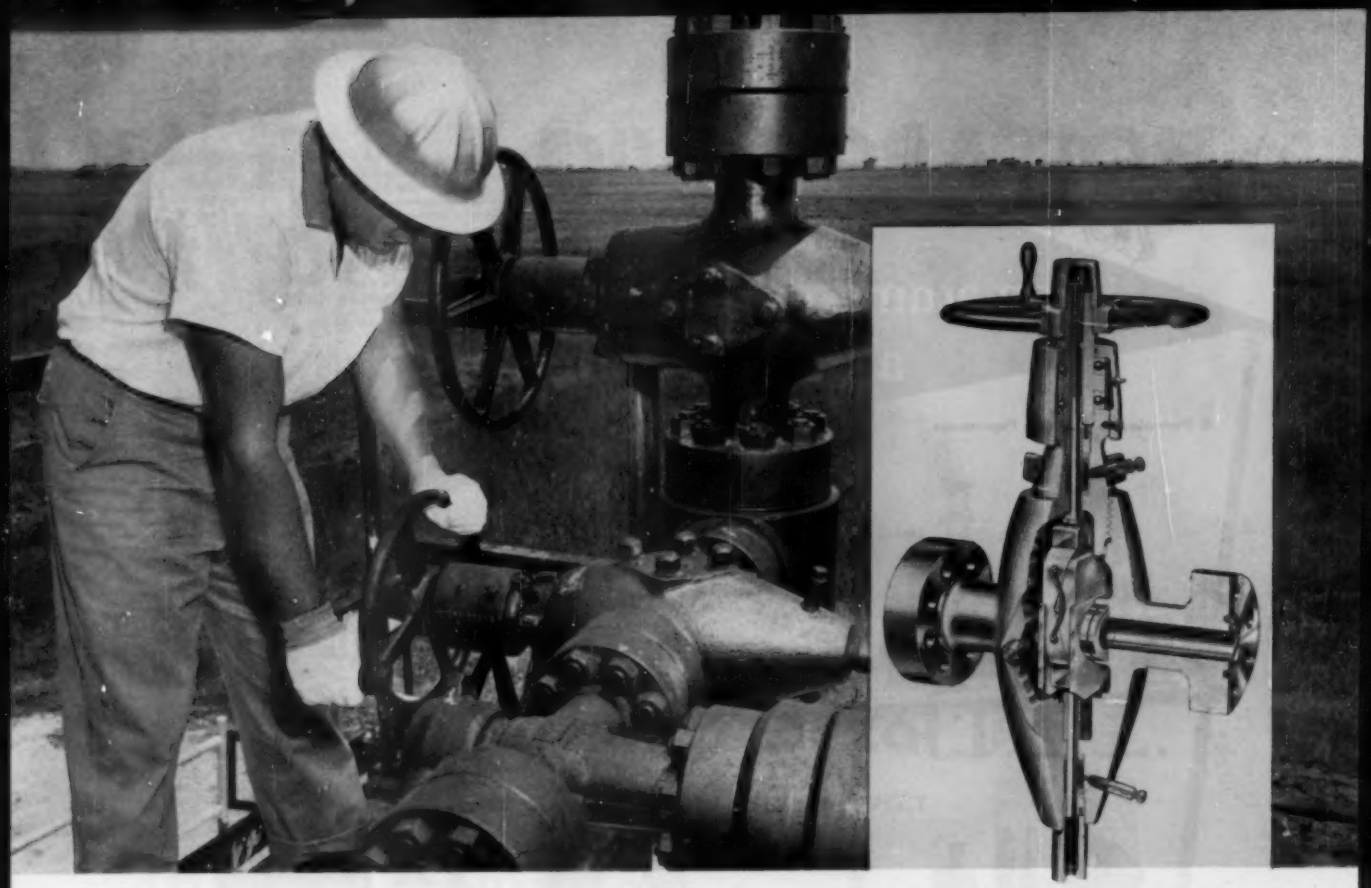
Now you know why more and more utility companies are turning to site or over-the-ditch wrapping for their distribution lines with time-tested, time- and money-saving Polyken tape.

For further information, write to the Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Ill.

Polyken®

Experienced in modern PROTECTIVE COATINGS

THE KENDALL COMPANY
Polyken Sales Division



Creative Engineering maintains the leadership of W-K-M® Through-Conduit Gate Valves

Oil men all over the world pronounce this valve the best production valve they ever used.

Field men recommend it; engineers specify it. Both know that a W-K-M Through-Conduit Gate Valve is, above all, *dependable*—a valve that will give them positive control of production pressures with only normal maintenance over long periods of time, a valve that has won a world-wide reputation for long-range economy

W-K-M's creative engineering is the reason why. It studies your valve problems, it invents solutions to them, it improves on solutions already made, it maintains W-K-M's leadership in valve design, and valve production.

This W-K-M valve is *your* valve; specify it with confidence—you can rely on its performance.

ON HAND. The most used sizes of W-K-M gate valves are carried by supply stores everywhere. Special sizes and special designs are produced as you need them.

For 10,000 and 15,000 psi Working Pressure W-K-M Balanced Stem Valves

W-K-M designed and built this valve to solve a valve operation problem posed by the very high pressures today's oil men must control.

The "balancing stem" is attached to the bottom of the gate to balance out body pressure that would be acting against a single stem. This eliminates the thrust load carried by bearings and threads in single stem valves. Whatever the pressure, the only loads to be overcome in opening or closing this valve are packing friction and normal operating loads. Thus very little effort is required to operate the handwheel.

The design includes parallel expanding gates, two thrust bearings, super-finished stems, and other important features that have established W-K-M's leadership

Sizes: 15,000 lb. W.P.: 1⅜", 1 11/16", 1 13/16", 2 1/16", 2⅜"
10,000 lb. W.P.: 2", 2½", 3", 3½"

Write for Test Bulletin WP-1058. It describes how this superlative valve successfully passed the oil industry's most punishing tests. For complete information about W-K-M's full line of oilfield valves ask for Catalog 200.

W-K-M

DIVISION OF ACF INDUSTRIES
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Service to the petroleum refining industry, in the fullest measure, has always been UOP's concept of its function. From the development, licensing and engineering of refining and petrochemical processes, through the field and laboratory services rendered to the users of these processes, we have conscientiously aimed towards providing all the elements needed to better the individual refiner's operating and economic position. The broad range of UOP service is always made available to the entire refining industry, and our customers include hundreds of refiners, large and small, the free world over. Indicated above are types of services we are furnishing to the industry. Some refiners use the full range of our service; some only those elements necessary to fulfill their needs. But either way, UOP has something to offer everyone in this business . . . and all under one roof.

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and they are the smoothest running units built today.

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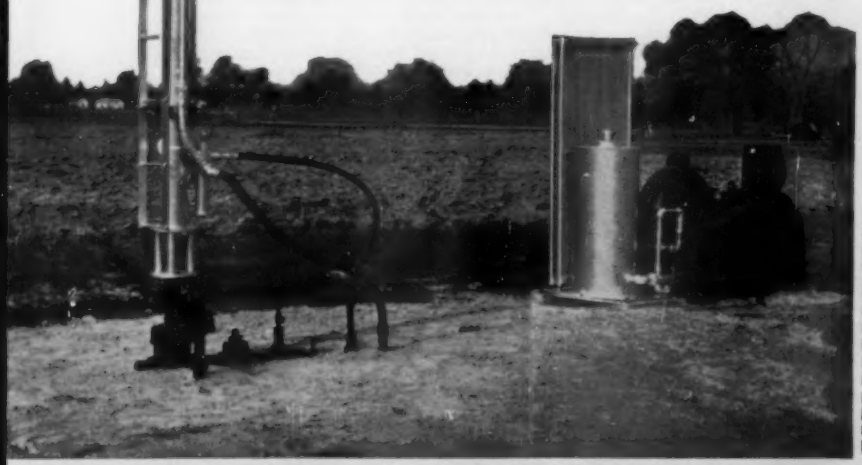

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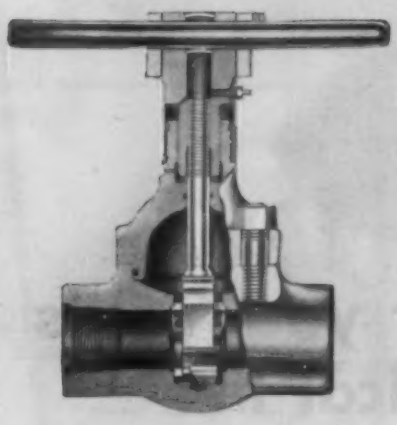
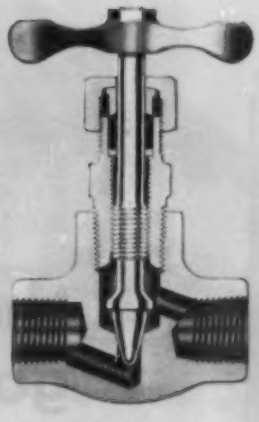
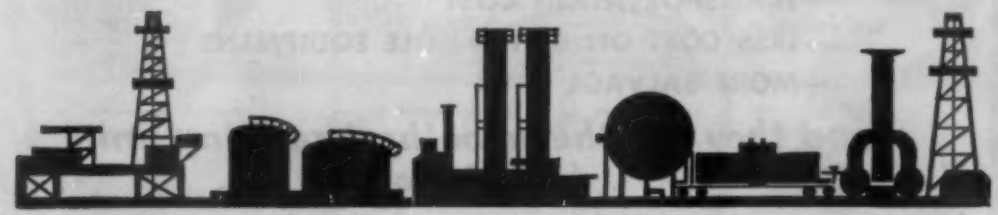


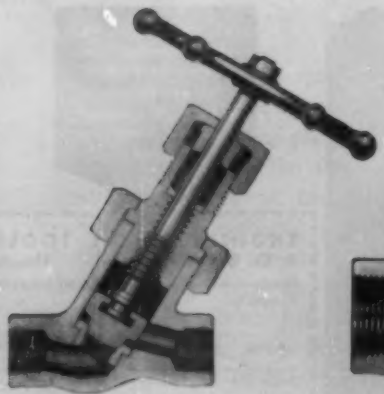
MUDWONDER MUDLINE VALVES
Figs. 2128-3128
For pressures to 2,000-3,000 lb WOG
Bolted bonnets, screwed or flanged ends

GLOBE STOP VALVE
Fig. 158
For pressures to 10,000 lb WOG
Screwed bonnet, screwed or socket welding ends

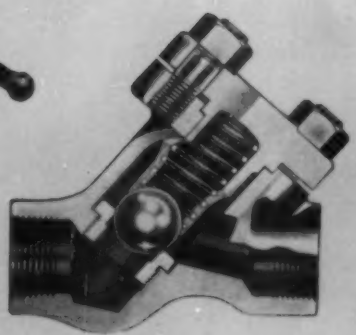


GLOBE GAGE VALVE
Fig. 152
For pressures to 4,000 lb WOG
Screwed or union bonnet, screwed ends

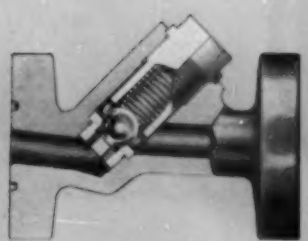




GLOBE STOP VALVE
Fig. 2698
For pressures to 2,000 lb WOG
Union bonnet, screwed or socket welding ends



BALL CHECK VALVE
Fig. 4632
For steam pressures to 600 lb A.S.A. (2,000 lb WOG)
Horizontal or vertical
Bolted cover, screwed or socket welding ends



BALL CHECK VALVES
Figs. 5160-9160
For pressures to 5,000-10,000 lb WOG
Horizontal or vertical, screwed covers, flanged ends

Valves Work Everywhere

in drilling...production...refining...

Edward valves are on the job, no matter where you look. From the towering derricks of Northern Alberta to offshore rigs on the Gulf . . . from refineries on the Jersey Flats to California natural gas plants . . . the word is—"You buy a better valve from Edward!"

Edward Globe Valves

Bodies are drop-forged steel, for greater strength and resistance to erosion. Large-diameter handwheels permit operation without a wrench or cheater; cross-arm Impactor* handle for quick, tight closing is standard on 2" Fig. 158. Figures 158 and 2698 have replaceable seats. Disks—both plug and needle types—are carefully aligned, and seats are lapped for tight sealing. Stems are EValloy,* an exclusive Edward stainless steel, centerless ground to a fine finish. Carefully machined Acme stem threads assure easy operation. Bonnet threads plated by an exclusive EValizing* process for maximum resistance to wear and corrosion. Deep stuffing boxes, with exclusive EValpak* asbestos-graphite packing, assure a tight seal with minimum resistance to stem turning.

Edward Ball Check Valves

Identical to Edward globe stop valves in body and seat features. Rolled steel bonnet with integral ribs to guide ball accurately. Ball is corrosion-resistant high carbon stainless steel, precision-ground for tight seating. High carbon stainless steel spring gives positive aid in seating ball.

Edward Mudwonder Valves

Body and bonnet are high-strength alloy steel with heavy body-bonnet cover flanges. Accurately machined to assure drop-tight sealing under extreme pressures. Double-threaded yoke bushing, completely enclosed, gives 2-to-1 ratio. Corrosion-resistant stainless steel stem with slotted gate coupling to eliminate bending or binding. Gate is hard chrome plated to reduce friction, resist erosion and abrasion. Seat insert of resilient buna–N synthetic rubber, molded integrally over steel wear rings. Seat and gate easily replaced without removing Mudwonder* from line.

WHERE CAN YOU USE EDWARD VALVES?

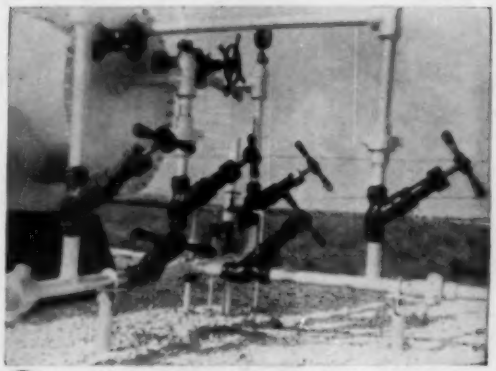
Our customers report complete satisfaction in the use of Edward valves for water flood service . . . throttling . . . on high-pressure heaters, treaters and separators . . . on pressure vessel controls . . . on headers and flow lines to heaters and exchangers . . . for manifold service . . . in gasoline or gas sulfur extraction plants . . . for "unloading" valves at gas compressor stations . . . and in many other applications. You name your need . . . let your Edward representative show how to fulfill it with versatile, economical, completely dependable Edward valves. They are available from your favorite oil field supply store, from your industrial distributor, or direct from *Edward Valves, Inc., 1200 W. 145th Street, East Chicago, Indiana* (Subsidiary of Rockwell Manufacturing Company). Represented in Canada by Lytle Engineering Specialties, Ltd., Montreal, and Rotary Sales & Service, Ltd., Edmonton.

EDWARD STEEL VALVES

another fine product by

ROCKWELL

Edward builds a complete line of forged and cast steel valves from ¼" to 18"; in globe and angle stop, gate, non-return, check, blow-off, stop-check, relief, hydraulic, instrument, gage and special designs; for pressures up to 10,000 lbs; with pressure-seal, bolted, union or welded bonnets; with screwed, welding or flanged ends. *T.M. Reg. U.S. Pat. Off.



Edward 2" Fig. 158 valves in service on heater-by-pass lines in Louisiana oil fields. Note Impactor handles for quick, easy closing against high pressures.

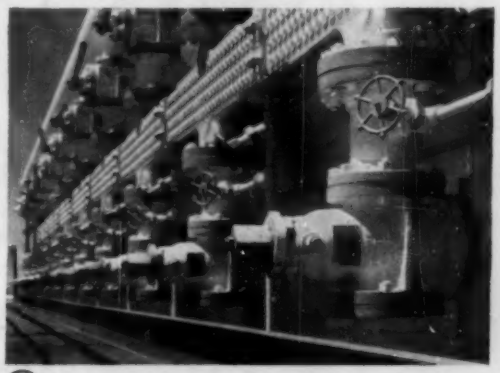
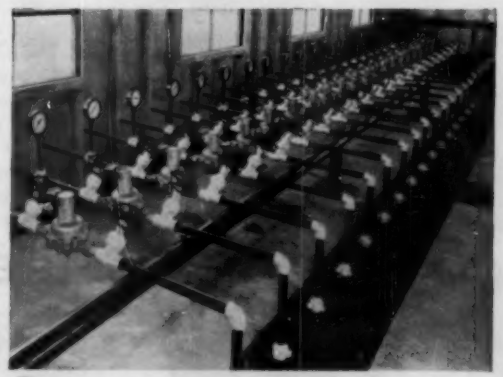
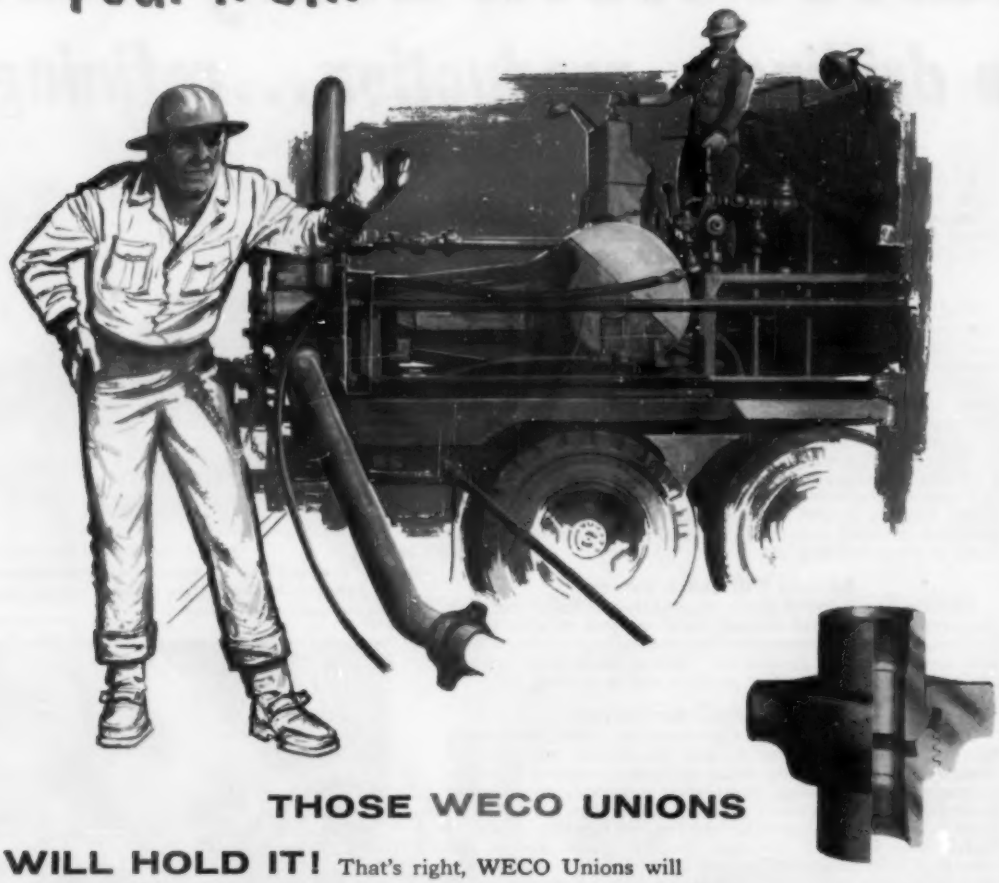


Fig. 2698 valves on cooling coils of natural gas cooler. Scene: New Mexico field processing plant. Lubricated plug valves in photo are Rockwell-Nordstrom.



Forty-two Edward forged steel globe valves (Fig. 2698) throttle the flow on this West Texas water flood. Owner reports absolutely no maintenance costs in two years (over 4,000,000 barrels of water)!

Pour it on!



THOSE WECO UNIONS

WILL HOLD IT! That's right, WECO Unions will hold the high pressures of today's — and tomorrow's — service jobs without leaking. Full-circle metal-to-metal contact sealing is always maintained by WECO's ball and cone seats. The strong forged steel nuts and subs can take the hard treatment of fast make-up and high-pressure shock and vibration.

You can rely on WECO Unions for your well service work and rig piping. See your WECO salesman or order from your Supply Store today . . . available in sizes 1" through 12", in pressures from 1,000 through 15,000 psi.

U-3-58

WECO®

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HOUSTON, TEXAS

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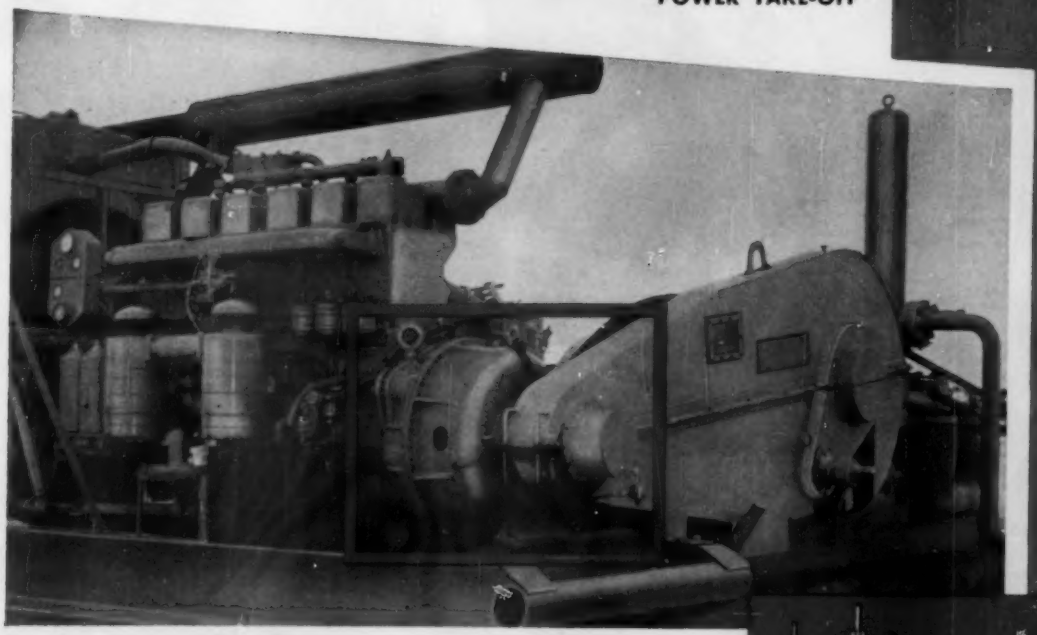
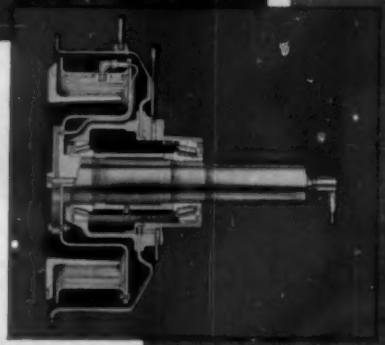
Air Controlled Shock-Free Operation with FAWICK PTO*

*POWER TAKE-OFF

Another Field-Proved Product Supplied by Mid-Continent





Air operated Fawick PTO has self-adjusting CB air-flex clutch and rugged anti-Friction shaft bearings.

The air operated Fawick Power Take-Off provides an ideal shock-free independent pump drive and may be remotely controlled from the driller's position. Heavy duty bearings and rugged bell housing eliminate the need for pilot bearing or outboard bearing. The Fawick PTO offers dollar savings in initial installation too, because it requires no special adapters, skids or outboard bearings. It bolts directly to the engine flywheel and flywheel housing. V-belt or chain drives are easily installed or removed from the open end clutch shaft, speeding up rig-up time. For complete information on the Fawick PTO, contact your Mid-Continent representative. Mid-Continent stores, sales offices and sales representatives are located in all active oil areas.

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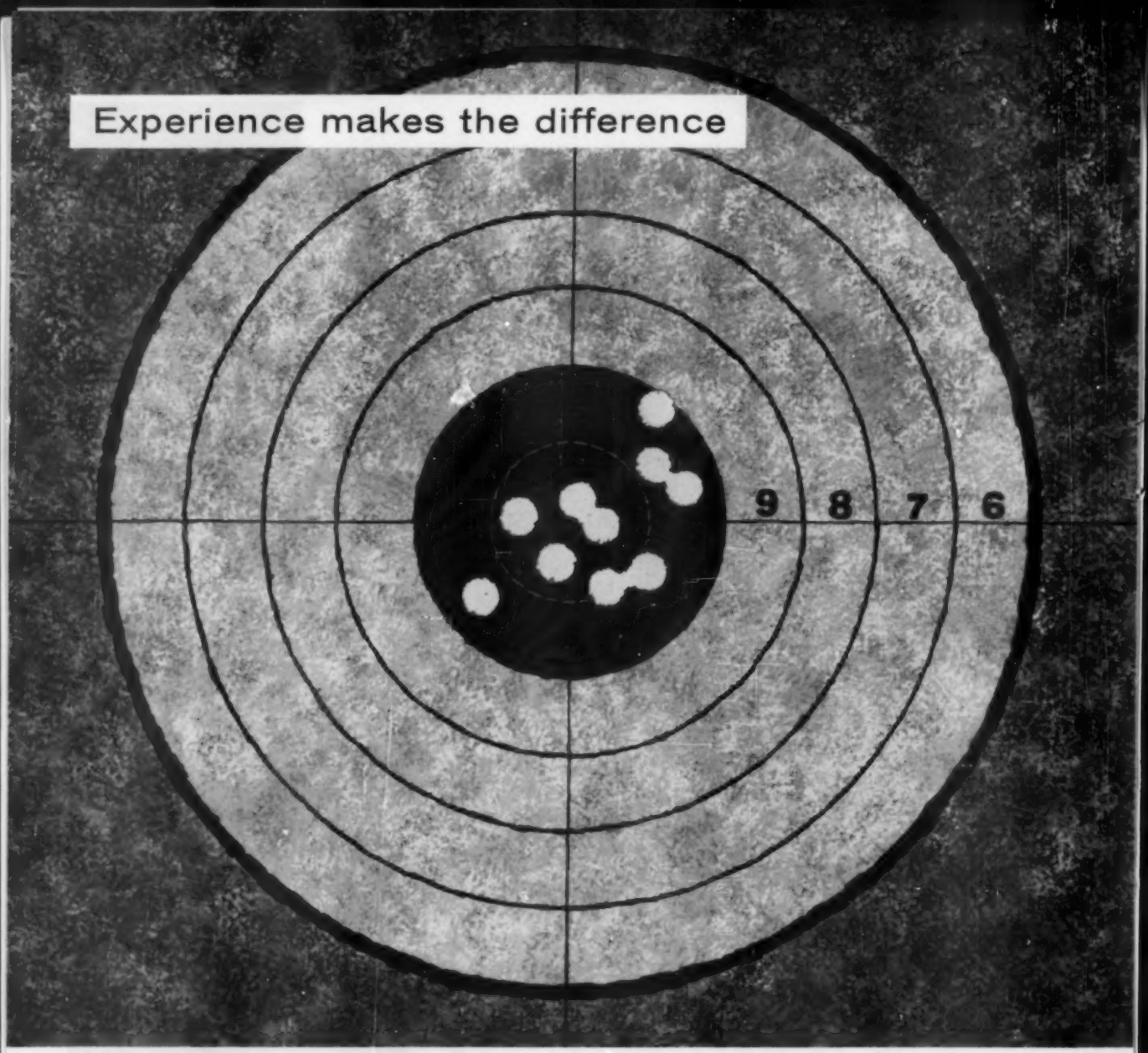

Production experience puts catalysts on-target at Davison

Year in and year out, carefully controlled production methods have enabled Davison to consistently produce catalysts to exacting specifications. That's one reason why Davison is the world's largest, most experienced supplier of catalysts for petroleum refining. What's more, production schedules at any one of Davison's strategically located plants are geared to give you top-quality catalysts on short notice. Give us a call!

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Buy DAVISON — the quality catalyst backed up by experience, research, technical assistance, service!

How to save 20% in joining a pipe line

Line-up and welding costs can take a big part of your pipe line construction dollars. But here is how Armco Welded Steel Pipe can reduce these costs by as much as 20 per cent.

Armco Pipe is supplied in standard 50-foot lengths instead of the ordinary 40-foot or double-random lengths. This means at least 20 per cent fewer field joints. Line up and welding time is reduced and you have fewer sections to handle.

What's more, the wide range of diameters (6 to 36 inches) and wall thicknesses ($\frac{9}{64}$- to $\frac{1}{2}$-inch) available in Armco Pipe lets you make the most economical choice to meet your specific requirements.

Use Armco Welded Steel Pipe to meet requirements in the Natural Gasoline and Natural Gas Divisions and wherever else you need dependable line pipe. Mail coupon below for prices and delivery time. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 3968 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

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3968 Curtis Street, Middletown, Ohio

Send me prices and delivery time on Armco Line Pipe. I am interested in the following: diameter_____

wall thickness_____ quantity_____

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Name_____ Title_____

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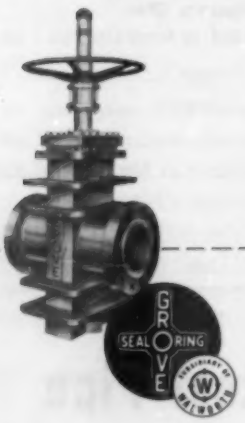
ARMCO®

Armco Welded Steel Pipe

.....wipe out the need for lubrication



Lubrication problems are wiped out with the squeegee action of the exclusive Grove Seal-O-Rings. Up or down movement of the gate through the floating seats cleans and polishes both upstream and downstream surfaces. Foreign matter which could cause sticking, distortion, or abrasion is removed. The "O" Rings provide smooth action through the seats and bubble tight pressure seals on both sides of the gate. Specify Grove Seal-O-Ring Gate Valves. When they're set you can forget about lubrication or sealing compounds forever.

Grove valves never require lubrication

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WOLVERINE
TUBE
Items of Interest to the Processing Industry

PUBLISHED BY WOLVERINE TUBE DIVISION

Use TRUFIN TYPE S/T in both Old and New Units

Wolverine Trufin Type S/T is a completely versatile heat exchanger tube—is equally at home in new units or old. When new heat exchangers and condensers are designed around Type S/T they are smaller and more compact because its integral fins increase heat transfer surface—handle more BTU's per foot of tube.

The net result is a substantial saving in direct tube costs as well as in labor and the materials that go into headers, baffles and shells.

When used for retubing purposes Trufin Type S/T steps up the capacity of existing equipment because its greater surface area packs more heat transfer surface into the same size shell.

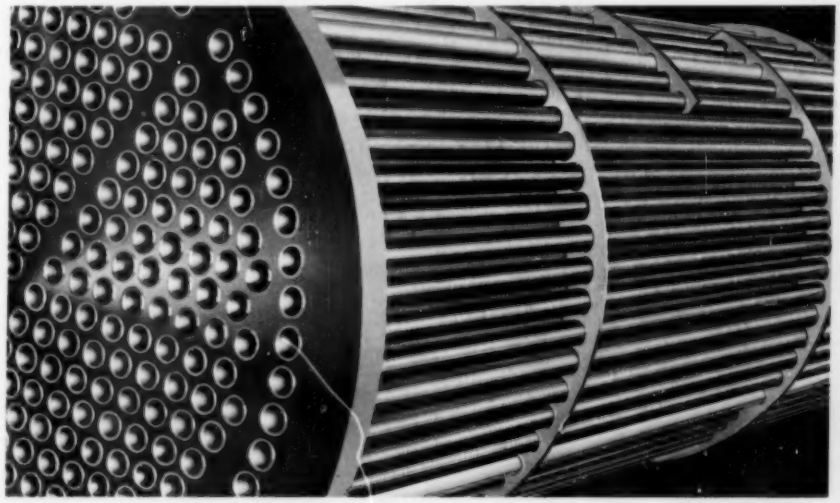
Also of major importance when retubing is the fact that Trufin Type S/T is completely interchangeable with the plain tube it is designed to replace. During the finning process the ends of the tube are left without fins so that the O.D. of the plain end is slightly larger than the O.D. over the fins.

Because of this, Type S/T can be inserted into the bundle and rolled directly into the tube sheet in the regular manner using only standard tools and retubing techniques.

Wolverine Trufin Type S/T

TECHNICAL HELP FROM FIELD ENGINEERING SERVICE

Always available to help customers solve problems in alloy selection, design, corrosion, etc., are the skilled members of Wolverine's Field Engineering Service.



HOW WOLVERINE TRUFIN® TYPE S/T SAVED 17 MILES OF TUBE FOR A LARGE EASTERN FABRICATOR

BY ERNEST DODD

No matter how you look at it 17 miles of condenser tube adds up to a lot of tube—and, when those 17 miles represent the amount of tubing saved in one installation then it becomes a significant figure indeed.

This substantial saving in direct tube costs occurred recently when engineers for a large eastern fabricator designed heat transfer units for an M.E.K. plant around Wolverine Trufin Type S/T—the original, integrally finned tube for shell and tube equipment.

The units included condensers, coolers, reboilers, and product heater, etc. From previous experience their engineers knew that with Wolverine Trufin Type S/T they could design units with smaller shells and still realize maximum throughput, save space by obtaining more compact arrangements and greatly reduce the amount of tubing required.

For example, had the units been tubed with prime surface tubing approximately 225,000 feet would have been required. To OBTAIN EQUIVALENT HEAT DUTY only 134,000 FEET OF WOLVERINE TRUFIN TYPE S/T WAS NEEDED — a saving of 91,000 feet or approximately 17 miles of heat exchanger tube.

Wolverine Trufin Type S/T is available in a wide range of sizes in copper, copper alloys, aluminum, and steel. In addition to the installation described above it is ideally suited for such operations as crude stills, reformers, cat crackers and alkylation plants, etc.

Next time you're considering new equipment, specify Wolverine Trufin Type S/T. If you're retubing, Trufin Type S/T can increase the capacity of existing equipment by as much as 70%—depending on the type of service in which it is used. Either way you can't lose. Write—TODAY—for complete information.

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From its years of experience in the heat transfer field Wolverine Tube has developed a condenser tube lineup designed to meet every need. Engineers can, for example, specify prime surface tube . . . integrally finned (Wolverine Trufin) or duplex tubing . . . all in a wide range of sizes and alloys. Next time you specify heat exchanger tubing remember that Wolverine Tube can meet *ALL* your needs.

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2. WOLVERINE TRUFIN TYPE S/T
3. WOLVERINE TRUFIN TYPE W/H
4. PRIME SURFACE DUPLEX TUBE
5. WOLVERINE TRUFIN—DUPLEX
6. WOLVERINE TRUFIN TYPE L/C
7. WOLVERINE TRUFIN TYPE H/R
8. WOLVERINE TRUFIN TYPE H/A
9. WOLVERINE TRUFIN TYPE I/L

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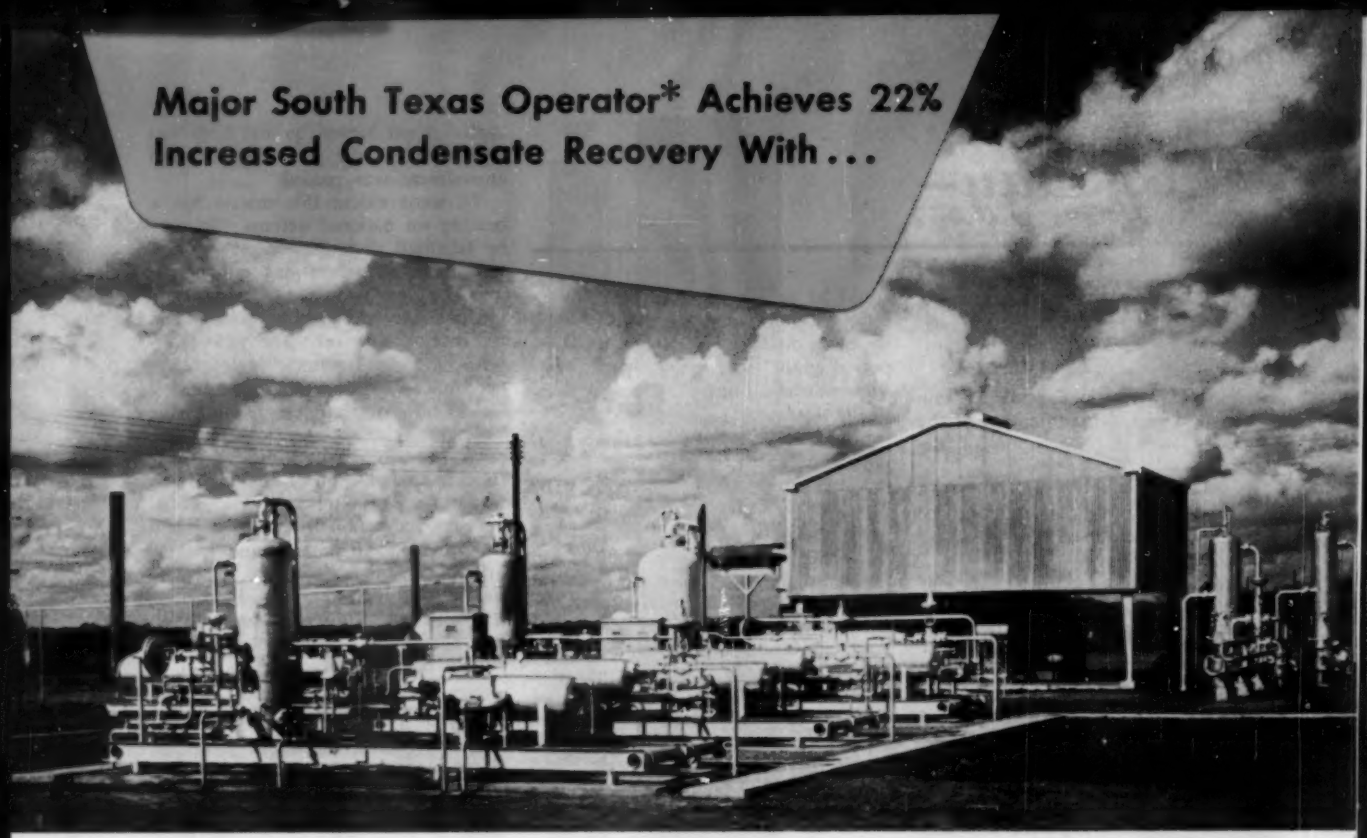
Major South Texas Operator* Achieves 22% Increased Condensate Recovery With . . .



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Down in Kleberg County, Texas, a major lease operator had 10 shut-in gas condensate wells which were to be put "on stream". The problem was to extract the *maximum* amount of condensates consistent with the *lowest* possible cost, and to lower water dewpoint of the gas to below pipeline contract specifications before it reached the sales line.

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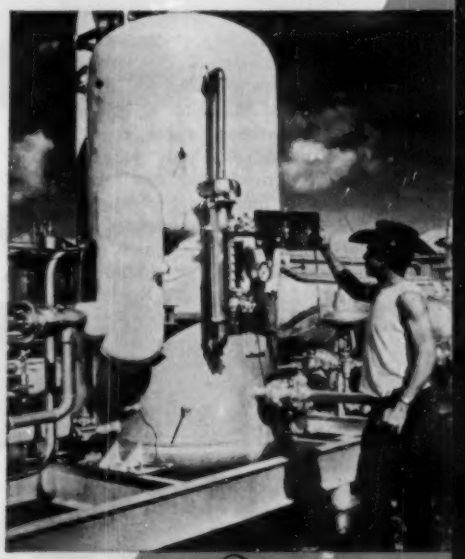
Operating at 25 MMSCFD with 2960 psig flowing pressure and 106° F. flowing temperature.

*Name furnished on request



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They Say—

Suggestion for Capt. Carson

Dear Sir:

I enclose herewith a copy of a letter which was mailed to Captain Carson suggesting modification of the proposed plan for operation of the voluntary oil import program.

I am attempting to enlist support for this change among some of the companies which would be adversely affected.

Harry A. Logan, Jr.
President
United Refining Co.
Warren, Pa.

Dear Captain Carson:

In the past the restriction of oil imports has been accomplished through voluntary cooperation by importing companies. In order to maintain the voluntary principle any revision of the program must recognize the competitive circumstances of individual companies.

The principal object to the proposed plan lies in the uniform treatment of all refiners in Districts 1 through 4. This approach is unrealistic and gives rise to the drastic revisions, both upwards and downwards, in existing allocations.

The vast majority of imported oil has always been processed in District 1 refineries and only recently have imports constituted any appreciable part of refinery runs in other regions. The economic consequences of oil imports are, therefore, much more pronounced in District 1 than in any other area east of the Rockies.

I would like to suggest that the proposed plan be modified to provide for a separate determination of a permissible percentage of imports to refinery runs for each district. This could be accomplished by taking the ratio of imported oil to refinery runs in each district over some previous period as the basis for applying a uniform allocation to each refinery within the district.

Allocations for new refinery capacity in districts with higher permissible imports would have to be restricted in order to prevent the migration of refining capacity.

The result of this modification would be that historical patterns would be given more weight and both increases and reductions in company-wide allocations would be much less severe than under the proposed plan as now constituted. It is my belief that this method would be far more equitable, and, therefore, would have much greater chances for widespread acceptance in the industry on a voluntary basis.

Harry A. Logan, Jr.
President
United Refining Co.

This bill deserves support

Dear Sir:

In the "Watching Washington" column of your September 15 issue, Mr. Linz mentions that Rep. Earl Wilson has introduced a bill providing for a 50% reduction in the capital-gains tax.

It seems to me that this is an important project which deserves the support of your excellent publication. For no line of activity is more deeply penalized by this obnoxious form of taxation than that of oil exploration and development.

My personal feeling is that Congress should go even further and abolish the taxation of gains in capital entirely on the theory that such growth of capital is not income as that term was understood at the time the sixteenth amendment was passed.

To some extent this matter has a bearing on national defense. It must be admitted that the present substantial import program has cut deeply into the incentives available to small independent operators to go out and try to find new oil. The two deterrents, a limited market and a 25% tax on capital gains, have stopped a lot of oil prospecting here at home.

There is little chance that the import situation will improve for some time to come. But, if the other deterrent, the capital-gains tax, could be removed, enough incentive might be provided to start people looking around again for a good place to drill a well in this country. It is upon that oil available here in North America that we will be dependent if war should come again.

H. L. Spencer
Pasadena, Calif.

Bureaucracy vs. competition

"What happens with voluntary controls is that there is an inevitable tangle as Government responds to political pressure; Government can't help but respond, for it is a political organism, not an economic one.

"And finally the tangle gets so bad that some persons in their necessity to survive must do things which do not constitute the compliance which is supposed to be voluntary. So the whole thing becomes mandatory....

"When voluntary becomes mandatory it is highly questionable whether freedom of enterprise remains.

"There is no reason to believe that the substitution of an all-powerful federal oil bureaucracy for a system of many competing companies would be any more successful in the U. S. than it is in avowedly socialist countries."

Editorial in the Wall Street Journal.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDER OF EVENTS

SEPTEMBER

29-
Oct. 3 Society of Automotive Engineers, national aeronautic meeting, aeronautic production forum, and aircraft engineering display, The Ambassador, Los Angeles.

OCTOBER

1-2 Western Petroleum Refiners Association, third annual stream-pollution and waste-disposal conference, Lassen Hotel, Wichita.

1-3 American Association of Oilwell Drilling Contractors, eighteenth annual meeting, Adolphus and Baker Hotels, Dallas.

1-3 McMurry College, American Association of Petroleum Landmen, Abilene Landmen's Association, second annual national conference on petroleum land management, McMurry College, Abilene, Tex.

3 American Institute of Chemical Engineers, South Texas section, thirteenth annual technical meeting, Moody Center, Galveston, Tex.

5-8 Society of Petroleum Engineers of AIME, fall meeting, Houston.

5-8 National Association of Corrosion Engineers, northeast region, Somerset Hotel, Boston.

5-9 American Society for Testing Materials, D-2 committee on petroleum products and lubricants, Mayflower Hotel, Washington.

7-8 Texas Mid-Continent Oil and Gas Association, annual meeting, Statler-Hilton Hotel, Dallas.

9-10 California Natural Gasoline Association, thirty-third annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

10-12 Tri-State Oil Show, Roberts Municipal Stadium, Evansville, Ind.

12-18 OIL PROGRESS WEEK.

13-15 American Gas Association, annual

convention, Atlantic City, N. J.

13-15 American Society of Mechanical Engineers, American Society of Lubricating Engineers, conference on lubrication, Statler Hotel, Los Angeles.

13-16 Society of Exploration Geophysicists, annual meeting, Hotel Gunter, San Antonio, Tex.

13-17 American Society of Civil Engineers, annual convention, Hotel Statler, New York.

15-16 South Dakota Independent Oil Men's Association, convention, Sheraton-Johnson Hotel, Rapid City.

15-16 University of Kansas, Southwest Kansas Center, sixth annual Gas Measurements Institute, Liberal, Kans.

15-17 National Association of Corrosion Engineers, north central region, Cincinnati.

15-17 Petroleum Conference on Well-Logging Interpretations, third annual conference, McMurry College, Abilene, Tex.

16-17 Society of Petroleum Engineers of AIME, Southern California petroleum section, Biltmore Hotel, Los Angeles.

16-18 New Mexico Geological Society, Arizona Geological Society, ninth annual field conference, Black Mesa basin, registration Gallup, N. M., Oct. 15.

16-19 Permian Basin Oil Show, Odessa.

19-21 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Adolphus, Dallas.

20-21 Instrument Society of America, national rubber and plastics instrumentation symposium, Akron, Ohio.

20-24 National Association of Corrosion Engineers, south central region, Roosevelt Hotel, New Orleans.

20-24 National Safety Council, forty-sixth National Safety Congress, Conrad Hilton Hotel, Chicago.

22-23 National Association of Corrosion Engineers, western region, corrosion control course, U. S. Grant Hotel, San Diego, Calif.

22-25 Southwestern Federation of Geological Societies, regional meeting, Mineral Wells, Tex.

22-24 Society of Automotive Engineers, national diesel engine meeting, Lord Baltimore Hotel, Baltimore.

23-24 Rocky Mountain Oil and Gas Association, annual fall meeting, Town House Motel, Omaha.

23-24 Western Petroleum Refiners Association, refining technology and industrial relations meeting, Rufus Garrett Hotel, El Dorado, Ark.

27-28 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

26-28 Gulf Coast Association of Geological Societies, Driscoll Hotel, Corpus Christi, Tex.

26-31 American Institute of Electrical Engineers, general meeting, Pittsburgh.

31 Natural Gasoline Association of America, Southern regional meeting, Carlton Hotel, Tyler, Tex.

NOVEMBER

5-6 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

6-7 American Association of Petroleum Geologists, Pacific section annual meeting, Los Angeles.

6-7 Louisiana Polytechnic Institute, School of Engineering, seventh annual instrumentation conference, Ruston, La.

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JOURNALLY SPEAKING

"See you at 7:30"

C. O. WILLSON is gone—leaving a void on the Big Yellow Book that can never be filled. In our sorrow, we are strongly inclined to pour out all of the personal things that so endeared him to us. This he would have vetoed.

So, habit is strong. We'll go along with him—or try at least. We learned, some of us the hard way, that Charlie's advice was as sound as you might expect from a thoroughly human person.

First, to answer some questions which friends would want to ask, but might hesitate to voice at this time. C. O.'s health had not been good for some years. A heart attack 5½ years ago resulted in doctors' firm orders to take it easy. These orders he took lightly—up to a point.

But knowing that he should slow down, he did the thing that is so characteristic of him. He resigned as editor, unequivocally, in February 1953 with the one thought that someone more active should have the position and that the Journal should have someone more active to spearhead its editorial direction. This was his decision and his alone.

But management knew that mutual need was too great to accept this, so he remained as "consulting editor." In this capacity Chuck was something of a problem. (Everyone had his particular nickname for this man.) An editor of many parts and talents, he declined to step into a story. The Journal has a man for each slot and the Commodore would never infringe, voluntarily.

Prolific of ideas, he would quietly do the leg work on some particular development, only to turn it over to another editor for the final writing, and the credit. This explains why his byline didn't appear often.

Under C. O., the Journal's editorial stature waxed through the 30's and 40's. It shook off its remaining traces of provincialism and became more clearly a national, a global instrument.

During these more than 17 years of active editorship, he brought many of us into the book and along the road to maturity. He never drove; he led. A gentle nature, however, belied the steely integrity that guided him always.

He took the industry personally, and it frequently troubled him deeply. Only days ago he was most disturbed at the unseasonal growth in gasoline stocks and at the furor surrounding the new imports plan.

Around the shop, admiration and respect were too tacit to be expressed openly. He thrived on an unrelenting barrage of ribbing. Take his "Middle East Speech." He took an incisive, extensive look at that arena before World War II had even cooled, returning with a crystal picture of what portended there. Coverage in the Journal was not enough. He spoke anywhere, everywhere on what he found and what he saw coming.

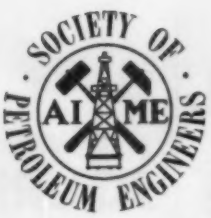
The staff well appreciated this typical tendency of going beyond the strictly necessary. But on the surface it appeared to cut little ice. Broad humor on the longevity of Willson's Middle East Speech became traditional.

By contrast his own brand of humor was dry, low-pressure. So typical was his habitual parting "See you at 7:30." This went over particularly well when he was visiting the nine-to-fivers in the New York and Los Angeles offices.

Before he left on vacation, he finished editing one of our biggest efforts in Journal history—Petroleum Panorama. It will be duly dedicated to 100 years of progress in oil. But to the staff an unwritten footnote will say, "To Chuck Willson who steered us through this thing with verity and judgment and insight."

His door remains open as it always was. Please pardon us our sentiments—we'll put out the book for years to come with the guiding thought: What would Charlie think?

The Staff.



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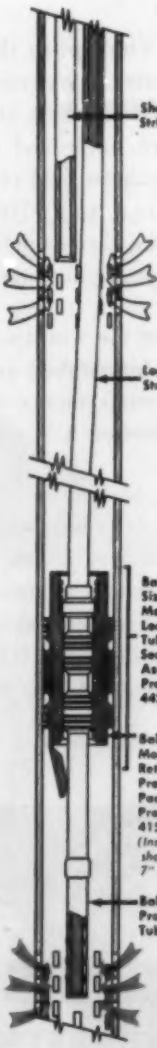
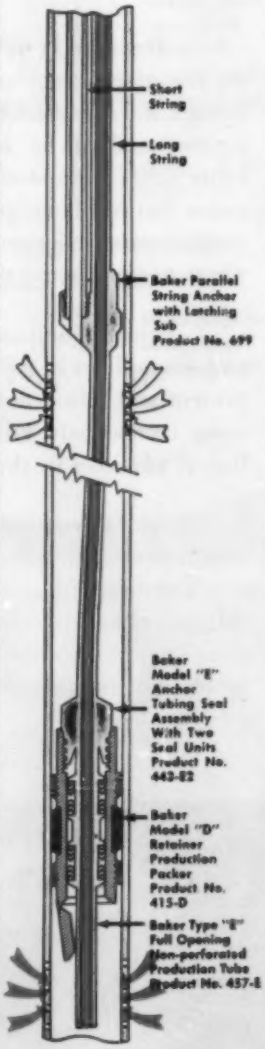

Short String
Long String
Baker Size 80-26 Model "E" Locator Tubing Seal Assembly Product No. 442-E2
Baker Model "D" Retainer Production Packer Product No. 415-D (Installation shown for 7" Casing)
Baker Production Tube

Permits removal of either string independently of the other regardless of sequence. Full-Opening (Tubing I.D.) Long String to lower zone.

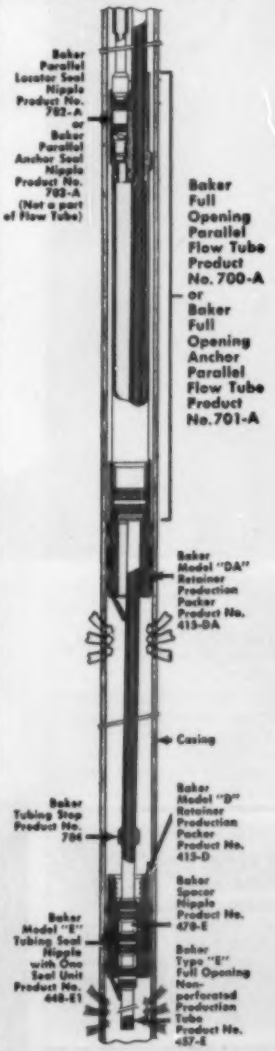
DUAL ZONE parallel string SHORT STRING ANCHORED


Short String
Long String
Baker Parallel String Anchor with Latching Sub Product No. 699
Baker Model "E" Anchor Tubing Seal Assembly With Two Seal Units Product No. 442-E2
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Type "E" Full Opening Non-perforated Production Tube Product No. 457-E

Permits removal of either string independently of the other, however long string must be run first. Short string pulled first. Full-Opening (Tubing I.D.) Long String.

DUAL ZONE parallel string TWO-PACKER HOOK-UP*

Ask for details of "Retrievable Upper Packer" installations, and other parallel string hook-ups.


Baker Parallel Locator Seal Nipple Product No. 702-A or Baker Parallel Anchor Seal Nipple Product No. 703-A (Not a part of Flow Tube)
Baker Full Opening Parallel Flow Tube Product No. 700-A or Baker Full Opening Anchor Parallel Flow Tube Product No. 701-A
Baker Model "DA" Retainer Production Packer Product No. 415-DA
Casing
Baker Tubing Stop Product No. 706
Baker Model "D" Retainer Production Packer Product No. 415-D
Baker Spacer Nipple Product No. 478-E
Baker Model "E" Tubing Seal Nipple with One Seal Unit Product No. 448-E1
Baker Type "E" Full Opening Non-perforated Production Tube Product No. 457-E

Illustrates Two-Packer parallel string installation with each zone confined to its individual tubing string with full-opening to lower zone for use of all permanent-type completion tools.

Why look five miles beneath our feet?

LAST week, for the first time in history, an oil well was drilled 25,000 ft. deep. This incident will get nowhere near the public attention that was given the fact that an athlete ran a mile in less than 4 minutes.

Yet this drilling record is more important to civilization than any athletic record since the original Marathon that saved Greece from the barbarians.

No oil or gas has been found in this well as yet. There is not even any assurance that oil or gas exists 5 miles below the surface of the earth. And no medals are awarded for setting deep-drilling records.

SO WHY IS THIS IMPORTANT? It is important because it shows that the oil industry is willing to spend its own money to hunt for new supplies of oil in places where oil has never been found before.

It is a tribute to the vision, daring, and scientific curiosity of Phillips Petroleum Co. that is doing this pioneering 5 miles down. It is a tribute to the progress of technology—the skill of the drillers; the planning of the engineers; the perfection of the materials, equipment, and instruments needed to penetrate rock 25,000 ft. beneath the derrick floor.

It costs a minimum of $1,500,000 to drill a wildcat well to such a depth, and the cost could easily run twice that. There is almost no hope that a single well could ever produce enough oil or gas to repay that much investment. And the chances of producing even a nickel's worth are considerably less than 1 out of 10.

So why gamble a couple of million bucks at such odds? Because the oil industry was built on such gambles. Only by taking risks was any oil ever discovered anywhere.

If a big reserve is discovered, and subsequent wells can be drilled at less cost because of the knowledge gained with the first one, then the venture could pay out financially. This is the main hope for the driller.

But even if the individual investors lose all, such expensive wildcatting is a gain for the public. It is just as important for the future to know where oil is not as to know where it is. Eventually the human race will need all the oil this planet contains. Only by wildcatting will we ever learn what areas, or what depths, must be written off as hopeless and the search concentrated elsewhere.

SIR EDMOND HILLARY climbed Mount Everest "because it's there." Scientists shoot rockets into space to learn what's there. Oil men are scientific pioneers of the same stripe. Their challenge is to explore deep beneath the remotest corners of the globe.

So long as the industry continues such exploration, so long is the public assured of adequate supplies of fuel.

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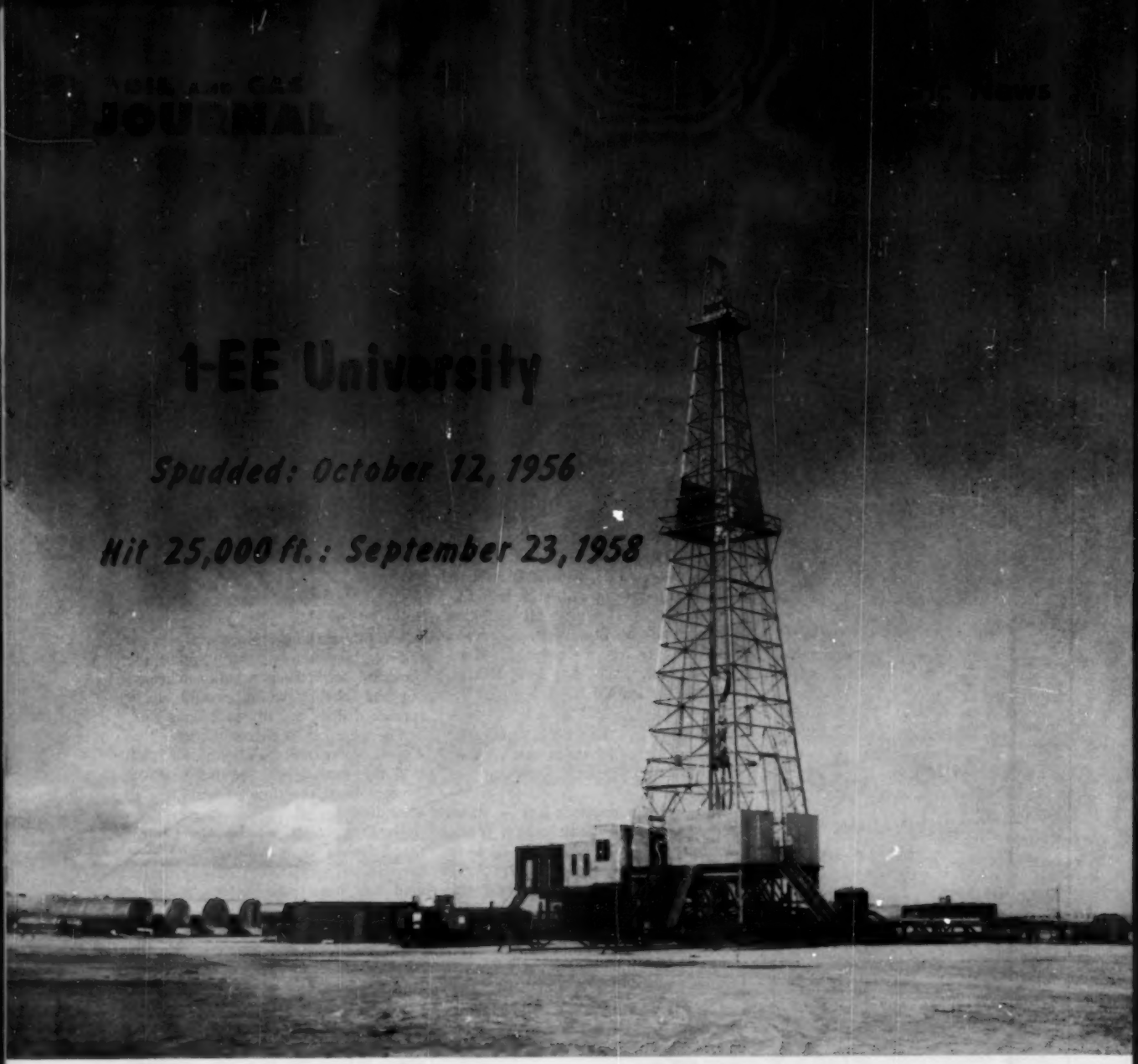


Phillips Writes History in Pecos Well

PHILLIPS Petroleum Co., looking for gas rather than glory, has written a new chapter in the history of the industry.

Phillips' 1-EE University, world's deepest well, swept past the magic milestone of 25,000 ft. last week and prepared to head into the Ellenburger sand for a projected total depth of 25,500 ft.

The Phillips organization was more jubilant about hitting the Ellenburger formation than crashing the 25,000-ft. barrier, but to the industry and the public the depth mark was the eye-opener. It symbolized the new era of exploring deep structures that may hold great petroleum reserves for the future.

The Ellenburger, chief objective of the expensive drilling venture in Pecos County, Texas, was found at 24,974 ft., just 26 feet short of 25,000. Had it not been found before 25,000, Phillips was planning to halt drilling temporarily and take extensive logs before deciding whether to go on.

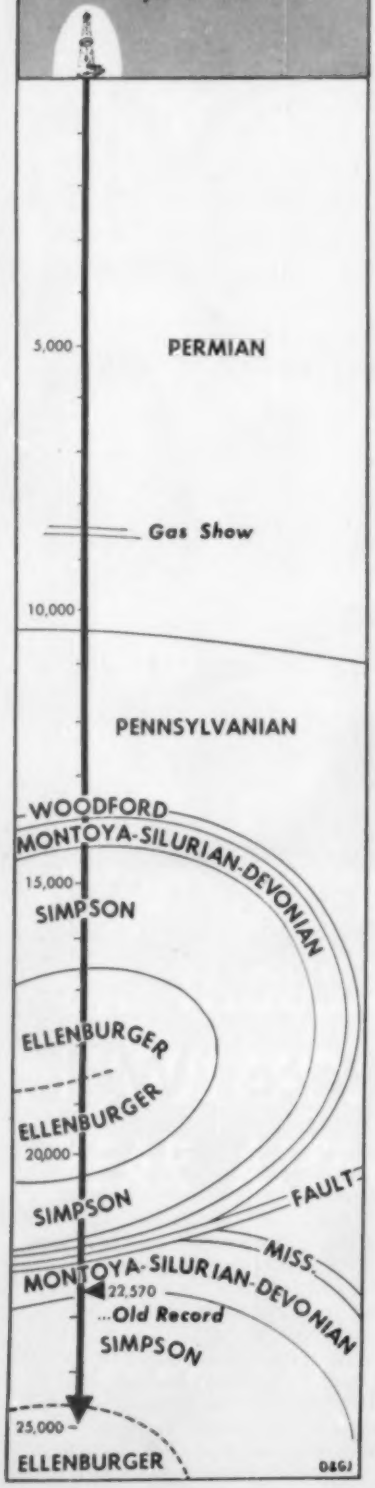
Management view . . . From a top official in the Phillips company came a hard-boiled view of the momentous event.

"We're not seeking records," the official said. "We have no desire to be in the limelight or be pioneers. We're only interested in finding oil or gas, and if a structure looks good enough, we will go after it."

The official said that Phillips has gained considerable knowledge of the deep structures in Pecos County because of its success in Puckett field and other nearby drilling operations.

Acting on the recommendations of

What Phillips Has Found in Drilling to 25,000 Ft.



its geologists, Phillips has sunk three deep wells within 15 miles of Puckett field, all seeking gas in the Ellenburger. The fact that all three have been drilling simultaneously is accidental; it does not mean that Phillips deliberately has started on a general program of deep drilling.

Timing for starting each well was governed by a different reason. In one case there was a short-term lease that had to be met. In another, acquiring more acreage depended on drilling a well. In the third, a Phillips partner was anxious to get started.

Does Phillips expect any of its deep wells to pay out? The question has no simple answer, but the company's top management believes that if another Puckett field is discovered by one of the three, Phillips "will be well-rewarded."

Phillips is not putting out information on how much the 25,000-footer is costing. But it is no secret that the three deep wells drilled in Pecos County are costing millions. In addition to the 1-EE University, Phillips has the 1-A Montgomery, bottomed at 23,400 ft. as the world's third deepest well, and the 1-A Harral, bottomed at 19,020 ft.

The geology . . . The 1-EE University is located about 10 miles east of Fort Stockton, 15 miles northwest of Puckett field.

The well is spotted just 4 miles southeast of a dry hole which found Ellenburger at 7,830 ft.—17,144 ft. nearer the surface. Geologists blame a huge fault for the great difference in depth and figure that the 1-EE's Ellenburger is part of another basin—the one that encompasses Puckett field. The Ellenburger at Puckett produces at 14,000 to 15,000 ft.

The 1-A Montgomery, 13 miles southwest of the 1-EE and 15 miles east of Puckett, found the Ellenburger at 22,598 ft.

The 1-A Harral is 10 miles southeast of the 1-EE in the direction toward Puckett. It failed to find the Ellenburger.

When Phillips spudded the 1-EE on October 12, 1956, the company expected to go to 18,500 ft. Later this objective was changed to 21,000 ft., then to 24,000 ft., then to 25,000 ft. And now, with the Ellenburger located just above 25,000, the company has set a new projected depth of 25,500 to give the formation a full test.

The principal reason for the miscalculation on depth of the formation was an overthrust of the Ellenburger above 17,000 ft. (chart). This had to be drilled through for several thousand feet. The bit then had to pass through the Simpson twice, not to mention three other formations, before reaching the base Ellenburger.

Geologists at Phillips take the forward view of the big project. One of them said last week:

"This is one of those deep-basin structures on which much of the future of the industry will depend. A lot of the shallow structures have been tapped, and these deep tests are paving the way for future development."

Geological work on the well has been under the general direction of Edwin Van den Bark, southwest regional manager of the land and geological department for Phillips at Bartlesville. Carl Lawrence is the division development geologist at Midland. He recently replaced R. C. Charles, who has been transferred to Houston.

What next? . . . When the drill hit exactly 25,000 ft. at 8 p.m., September 23, Phillips ceased drilling operations temporarily to pull the drill pipe for inspection.

Weight and torque on the pipe have produced tremendous strain, and the operators took the precaution of making the check, which would delay further drilling for about 2 days.

The company expects to take 3 to 4 weeks to reach total depth of 25,500 ft. This means it will require just over 2 years from the time of spudding to bottom the well.

Extensive tests will be made when the Ellenburger is fully explored. So far the only indication of pay in the well has been possible gas show at 8,549-8,647 ft. in the Permian.

Phillips recognizes that even if it finds gas or oil, the problems of completion will be monumental at 25,000 ft. and below.

As one official put it: The science of drilling is outstripping that of production, and it may take 5 to 10 years before the two are equalized.

In other words, as he explained it, "We will have to get a really good well to make it pay."

The drilling . . . Phillips has taken some calculated risks in getting to 25,000 ft., and it had one near-disaster—a fishing job at 21,397 ft.

But the crew and the equipment have performed remarkably well, and there are no major problems today the drillers feel they cannot solve in their drive toward 25,500 ft.

Last January 4, the drill pipe parted in the body of the pipe when the bit was 3,600 ft. off bottom. Backing off from 16,000 ft., the drillers recovered fish to 19,986 ft. and then whipstocked.

The first effort to whipstock failed

NO. 2: SHELL'S 5 RUMBERGER in Elk City, Oklahoma, field is world's second deepest (U. S. Steel photo).

NO. 3: PHILLIPS' 1-A MONTGOMERY in Pecos County, Texas, has given up the No. 2 spot to Shell, is testing.

Two More Deep Holes Share Phillips' Spotlight

WHILE drillers in Texas cut their way to 25,000 ft. last week, a well in Oklahoma took over as the second deepest in the world by drilling below 23,468 ft.

Shell Oil Co.'s 5 Rumberger, in Beckham County's Elk City field, passed the second-place 1-A Montgomery of Phillips Petroleum Co., which has bottomed at 23,400 ft.

The 1-A Montgomery is located 13 miles southwest of Phillips' 25,000-footer, the 1-EE University, in Pecos County, Texas.

The three wells — the 1-EE University, the 1-A Montgomery, and the 5 Rumberger—have all beaten the old world depth record of 22,570 ft., set in South Louisiana in 1955 by Richardson & Bass.

Shell's well is projected to 24,000 ft. and therefore will not challenge the 1-EE's mark. It has found the Springer sand but has not yet stopped to test. However, it had a gas show at 20,097-102 ft.

Geologists originally expected to find the Springer at about 17,500 ft., but it came much deeper. Even yet the geologists are not sure just where they entered the formation, but they're certain they have it now.

The $2-million well is a triumph for Helmerich & Payne, Tulsa drilling contractors, who now take over as the operator of the deepest well ever drilled by a contractor. The operation has been remarkably trouble-free since spudding in July 1957. It now has 3,460 ft. of open hole.

The 1-A Montgomery, drilled by Great Western Drilling Co. for Phillips, went to total depth of 23,400 ft. in late July and since then has been testing or preparing to test.

Currently, the operators are fishing for a packer. The tubing pulled in two, and one packer and the tail pipe went into the hole.

At the time of the accident, testing was under way at 22,650-880 ft.

Earlier tests in 400 ft. of open hole below 23,000 ft. gave only a slight show of gas.

The fourth deepest well in the world is the old record holder, Richardson & Bass 1 LL&E Humble "L," which still holds the title as the world's deepest producing well at 21,465 ft.

It's total depth of 22,570 ft. was reached in December 1955, and subsequent assaults on this mark failed until the 1-EE University went beyond it last May 26.

In July the 1-A Montgomery beat the Richardson & Bass mark, and then, in August, the 5 Rumberger passed the old mark.

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when the drill pipe twisted off after 35 ft., but the second try, at 19,965 ft., was successful. Hole No. 2 is about 100 ft. from the original projected hole.

At one point during drilling, Phillips had nearly 12,000 ft. of open hole, a world's record. In June the company ran 22,919 ft. of 7-in. and 7⅝-in. casing, a world's record by 3,100 ft. (OGJ, June 23, p. 77).

The present drill pipe, installed in early September, consists of 10,200 ft. of 3½-in., 1,550-lb., 43-40 grade, internal flush; 6,000 ft. of 3½-in., 1,330 lb. slim hole; 8,500 ft. of 4-in. Hydril flush joint; and 300 ft. of 4½-in. drill collars.

The crew is handling the top 10,200 ft. with Phillips' own specially developed device for deep drilling—a

hydraulic shock absorber unit and dual elevators. The rest of the pipe is handled conventionally with slip and elevators.

The hole diameter currently is 5¾-in.

For the last 3,000 to 4,000 ft., Phillips has used Hughes R-1 and W-7R bits, mostly W-7R's since 22,900. The bits are good for 20 to 30 hours. Round trips take 12 to 13 hours.

Other data . . . Circulating pressure is around 1,900 psi. at the present depth, and the annulus velocity is 120 ft. per minute.

Temperature at 22,910 ft. was 315° and, figuring an increase of close to 1° per 100 ft., Phillips estimates the current bottom-hole temperatures at 335°-340°. The flow line temperature is 140°.

Drilling muds, as earlier, are still low solids oil emulsion Driscose with graphite added. Weight is 11.8 lb. per gallon, viscosity about 55 seconds, and water loss 5 cc.

Equipment on the 1-EE is virtually the same as it was when the well broke the old depth record of 22,570 ft. (OGJ, June 2, p. 63).

Phillips drillers admit they have "quite an accomplishment" in punching the 1-EE University to 25,000 ft.

But they add hastily that 25,000 ft. in Pecos County, Texas, doesn't mean that 25,000-ft. wells will be sprouting throughout the oil country. For example, they see tougher problems on the Gulf Coast, where temperatures are higher, and heavier muds are needed in the unconsolidated formations.

H. W. Patterson, superintendent for Phillips drilling at the Bartlesville headquarters, is in overall charge of the 1-EE drilling. Wade Ramzy is the West Texas drilling division superintendent at Odessa, and the two rig superintendents are J. R. Jackson and M. T. Johnson. C. A. Parsons formerly was one of the rig superintendents.

How Phillips' Well Compares With Earlier Drilling Records

Depth (ft.)	Date	Owner	Name and location
10,030	June 1931	Chanslor-Canfield Midway Oil Co.	2-A Hobson, near Rincon field, Ventura Co., Calif.
10,585	Aug. 1931	Penn Mex Fuel Co.	Jardin 35, State of Vera Cruz, Mexico
10,944	1933	North Kettleman Oil & Gas Corp.	1 Lillis Welsh, Kettleman Hills, Fresno Co., Calif.
11,377	April 1934	General Petroleum	1 Berry, South Belridge field, Kern Co., Calif.
12,786	June 1935	Gulf Production	103 McElroy, McElroy field, Upton Co., Tex.
15,004	April 1938	Continental Oil	2-A KCL, Kern Co., Calif.
15,279	April 1944	Phillips Petroleum	1 Price, 25 miles southeast of Fort Stockton, Pecos County, Tex.
16,246	1944	Standard of California	20-13 KCL, South Coles Levee field, Kern Co., Calif.
16,655	1945	Phillips Petroleum	3 Fannie Schoeppe, E. M. Millican Survey, Brazos Co., Tex.
16,668	Nov. 1946	Pacific Western	1 National Royalties, east of Lost Hills field, Kern Co., Calif.
17,823	1947	Superior	51-11 Weller, north of Fort Cobb, Caddo Co., Okla.
18,734	March 1949	Superior	1 Limoneira, east of Ventura, Ventura Co., Calif.
20,521	June 1949	Superior	Pacific Creek Unit 1, southern Sublette Co., Wyo.
21,482	1953	Ohio Oil Co.	72-4 KCL-A, Paloma field, Kern Co., Calif.
22,570	Dec. 1955	Richardson & Bass	1 LL&E Humble "L", Plaquemines Parish, La.
25,000	Sept. 1958	Phillips Petroleum	1-EE University, east of Ft. Stockton, Pecos Co., Tex.

Century of Drilling: 69½ Ft. to 25,000

BASED on past performance, it will be 7 to 11 years before the industry has a 30,000-ft. well.

But allowing some "Kentucky windage" for the way deep drilling has hit the industry in recent years, a 30,000-ft. well could be just around the corner.

It has taken the industry almost a century to hit 25,000 ft., but most of the gains in deep drilling have come in the past 25 years.

The 10,000-ft. mark was established in 1931. Seven years later, in 1938, drillers passed 15,000 ft. In 1949 they hit 20,000 ft. And now, in 1958, Phillips Petroleum Co. has sunk its bits to 25,000 ft.

In the hurly-burly of oil development since Col. Drake went to 69½ ft. in 1859 at Titusville, Pa., the industry has failed to keep official records on who was drilling the deepest.

But since Chanslor-Canfield Midway Oil Co., a Santa Fe Railroad subsidiary, went to 10,030 ft. in June

1931 in Ventura County, California, the records are fairly straight (see table).

Early records . . . Two years after Drake's first commercial well came in, A. P. Funk drilled to 450 ft. on Oil Creek in Pennsylvania to prove that deeper sands would produce flowing wells.

Within 14 years of Drake's discovery, it is known that wells were going as deep as 2,000 ft., and by 1898 the 5,000-ft. mark had fallen.

Forest Oil Corp. is credited with sinking a 5,575 ft. well near West Elizabeth, 12 miles south of Pittsburgh, in 1898. At the time, it was the deepest in the U. S. The cost: $40,000.

Unofficial history says that Hope Natural Gas Co.'s 4190 Martha Goff farm, Harrison County, W. Va., went to 7,386 ft., on march 4, 1918, thus returning the world's depth record to the U. S. from Germany.

The German record-holder, at Czuchow, Upper Silesia, had gone to 7,345 ft.

During the 1920's, U. S. drillers flirted with 10,000 ft. on several occasions but never made it.

The Oil and Gas Journal, in recording the first 10,000-ft. well in 1931, commented: "Deep drilling records have been broken and re-established so many times during the past few years that it is rather difficult to list them chronologically."

Among the deeper wells drilled prior to 1931 were Shell Oil Co.'s 1 Williams, at 9,700 ft., in the Semitropic region of Kern County, California; Oscar Howard's No. 7 Hathaway, at 9,356 ft., in Santa Fe Springs field of the Los Angeles basin; Shell's 11 Mesa, at 9,280 ft., at Long Beach; and Continental Oil Co.'s 24 Selover, at 9,054 ft., in the Seal Beach field of Los Angeles basin.

Chanslor-Canfield may have held a world record in 1927, when its 96 Olinda in Fullerton field, Los Angeles basin, went to 8,201 ft.

Modern times . . . Fifteen times the depth record has been broken since Chanslor-Canfield did it with its 10,030-footer in 1931.

Continental Oil Co., with a 15,004-ft. well in 1938, was the first to reach 15,000 ft. Continental also had the distinction of holding the record the longest—6 years.

The well was the 2-A KCL in Kern County, and the Journal wrote of it at the time: "It is difficult to imagine a hole in the ground 15,004 ft. deep. It is hard to visualize the significance of an intricate completion method performed for the first time 2½ miles below the surface."

It was Phillips that finally beat the Continental mark in 1944 with its 1 Price, located 25 miles southeast of Fort Stockton, in Pecos County, Texas. And coincidentally it is the same Phillips company that has recaptured the depth record in 1958 with another well just a few miles away.

In 1947, Superior Oil Co. took over deep well honors for 6 years—but not with the same well. Superior drilled three wells in Oklahoma, California, and Wyoming that successively set new marks.

The Wyoming well was the first to master 20,000 ft. It was the Pacific Creek Unit 1 in Sublette County, drilled to total depth of 20,521 ft. in June 1949.

The Pacific Creek held its title for 4 years, succumbing finally to Ohio Oil Co.'s 72-4 KCL-A in Paloma field, Kern County.

Then, in December 1955, Richardson & Bass brought the depth record to South Louisiana with its 1 LL&E Humble "L" in Plaquemines Parish, La. The Richardson & Bass well also became the world's deepest producer at 21,465 ft.

Other deep wells in Texas and Oklahoma nipped at this mark in 1957 and early 1958, and finally the 1-EE smashed it at 8:25 p.m., May 26 (OGJ, June 2, p. 63).

Sidelights . . . California has held the depth record more times than any other state, and only once since 1931 has the record left the U. S.

Of the 16 record holders below 10,000 feet, eight have been in California, four in Texas, and one each in Oklahoma, Wyoming, Louisiana, and Mexico.

The Mexican record well was drilling in 1931 by Penn Mex Fuel Corp. in the state of Vera Cruz and went to 10,585 ft.

Superior and Phillips have each had three record holders, and no other company has had more than one.

The first well to go at least 2 miles (10,560 ft.) underground was the Mexican well.

The first to go 3 miles (15,840 ft.) was Standard Oil Co. of California's 20-13 KCL in South Coles Levee field, in Kern County. It bottomed at 16,246 ft. in 1944.

The first to go 4 miles (21,120 ft.) was Ohio's 72-4 KCL-A in 1953.

The 5-mile mark-26,400 ft.—is 900 ft. beyond the projected depth of the 1-EE University.

Death Claims Journal Veteran

C. O. WILLSON, a member of the editorial staff of The Oil and Gas Journal for 36 years and its editor for 17, died September 19.

Death followed swiftly an early-morning heart attack. Willson was on vacation and was visiting his son in Durango, Colo.

Willson, who was 65, began his career as a newspaper man. He came to the Journal in 1922, moving to New York several years later as refining editor.

He returned to Tulsa in 1936 to to direct all editorial activities of the magazine and continued to do so until 1953. A heart attack took him out of action for several weeks, and upon his return to the office he resigned as editor.

He was appointed consulting editor and continued to be a full-time writer, editor, and traveler. Only the week before his death he had completed a year-long editing job on Petroleum Panorama, the history of oil to be published by the Journal early next year commemorating the 100th anniversary of the world-wide petroleum industry.

Willson was one of the most widely known and respected oil writers in the world, and nowhere was he more highly thought of than within his own organization (See p. 27).

C. O. Willson

He was a former president of the Tulsa Press Club, an elder of the First Presbyterian Church, a Rotarian, and had been a member of the National Press Club, the American Institute of Mining, Metallurgical and Petroleum Engineers, Nomads, and other civic and professional organizations.

Alaskan Well Nears Projected Depth

DISCUSSING core tests at the wildcat are Morgan J. Davis, Humble president, center, and geologists Fred Sollars, left, and Marvin Rushing.

IT TAKES perseverance and big money to drill for oil in Alaska.

Last week, for example, Humble Oil & Refining Co. completed a full year of drilling operations at a lonely wildcat in the Kanatak Bay area of the Alaska Peninsula (photo).

As drilling entered the second year, the bit was inching its way below 12,000 ft. in a hole projected to 12,500 ft. The next few days should tell the tale—whether Humble has an important discovery or an expensive dry hole.

The test is the Humble-Shell Bear Creek 1. It is being drilled by Humble for half interest in Shell Oil Co. leases covering an undisclosed amount of acreage (OGJ, Apr. 29, 1957, p. 110).

With oil fever running at an all-time high, any commercial oil discovery there would be of tremendous importance. But whether or not it finds oil, the well will represent a huge investment.

Humble President Morgan J. Davis recently gave a hint of how much that investment will be. In an address at Anchorage, he pointed out that each offshore well drilled by Humble last year cost an average of $585,000, or about four times as much as a comparable well on land. "Our first Alaskan wildcat, however, may add up to

several times the average cost of our offshore wells," he added.

Regardless of the outcome of the Bear Creek 1, Humble has indicated it will be just the first well in a long-range Alaskan exploration program.

"Operation in the Kanatak Bay area, including transportation of equipment and drilling, may ultimately cost almost as much as Secretary of State Seward paid the Russians for Alaska originally," the company announced. "Seward's Folly," as that purchase was called by an indignant press, carried a price tag of $7,200,000, or about 2 cents an acre.

Humble's venture, like Seward's, doesn't contemplate an immediate return on the investment.

As early as 1953 Humble was working on an evaluation of Alaska's oil prospects. During following summers Humble exploration men were in Alaska for a closer look.

Problems faced . . . The company carefully considered many sound arguments against moving a rig to Alaska. Then, early in 1957, it decided to go ahead.

One of the biggest problems was the long-distance shipment of heavy equipment. Eleven bargeloads of supplies and equipment were shipped to Alaska from Seattle. Another costly problem was the construction of a 5-mile road to the drill site over mountainous country.

The weather, too, was a factor to be considered before the well was spudded on September 23, 1957. During the next 6 months gales of more than 75 miles an hour were reported on 31 occasions. The wind velocity reached 100 miles an hour or more on 11 of these days.

At times rain was a more vexing problem than the wind. In one 16-day period nearly 28 in. of rain fell at the well site.

During the winter, temperatures dropped to 20° and 22° below zero. A 100 m.p.h. wind was recorded on the same day the mercury fell to 22° below. The drilling rig was shut down when mud froze in the lines.

There also have been many subsurface problems. An extremely hard formation at about 10,500 ft. brought drilling almost to a standstill. In one stretch the crew was tied up for about 50 days on a single fishing job. After failing to recover the fish, the crew found it extremely difficult to sidetrack the hole in the hard formation. Seventeen whipstocks were set before a turbo drill succeeded in sidetracking the hole.

At the end of the first year of operations more than 100 days had been spent in fishing or sidetracking.

watching WASHINGTON

Bertram F. Linz

• Only 11 more years to ride the train

THE PASSENGER TRAIN is fast falling victim to the gasoline age.

Passenger service, except for commuters, will join the dodo by 1970 if the present trend continues, an Interstate Commerce Commission aide predicts.

The ICC official's gloomy view sums up a year-long investigation of railroad losses on passenger service. Here is what it showed:

Fewer than 385 million passengers may ride the major railroads this year. That is about the number carried back in 1890, and less than one-half the 915.7 million riders in the peak year of 1944.

Ninety percent of intercity travelers now go by private auto. Two-thirds of the remaining 10% travel by buses or airplanes. The railroads get what is left.

It may be that some way will be found to halt the loss of passenger traffic, Examiner Edward Hosmer says. But nothing is now in sight.

Government subsidies for air and highway transportation and the tremendous increase in operating costs are important factors in this situation. But taxes also are eating deeply into the carriers.

• Labor's list of issues growing longer

REFINERS are watching labor moves closely. Their hope: A hint of the demands they may face when it's their turn to talk terms with their workers.

The first of the new auto industry contracts was set week before last. Last week, the OCAW convention was held in Long Beach, Calif. From either could come an idea of what labor is thinking about today.

Industry is well aware that as labor reaches one major goal it sets up another. Thus, over the past couple of years length of contract has become the third most frequently raised issue in bargaining talks.

The auto workers accepted a 3-year contract in settling with Ford. In return, they get a severance pay program. That also is an issue that is looming big in mass production industries, which are going in for automation and other techniques which labor sees reducing the number of jobs.

Wages, of course, are the top item in union demands. Next comes vacations and holidays. After contract length come pensions, insurance and welfare. Then, hours and overtime, protection of workers' seniority and union security.

Arising more recently, maybe to become important in a year or two, are questions of annual wage guarantees, arbitration and management prerogatives.

These are the basic issues. Added to them are problems peculiar to individual industries. That makes for a long list of demands.

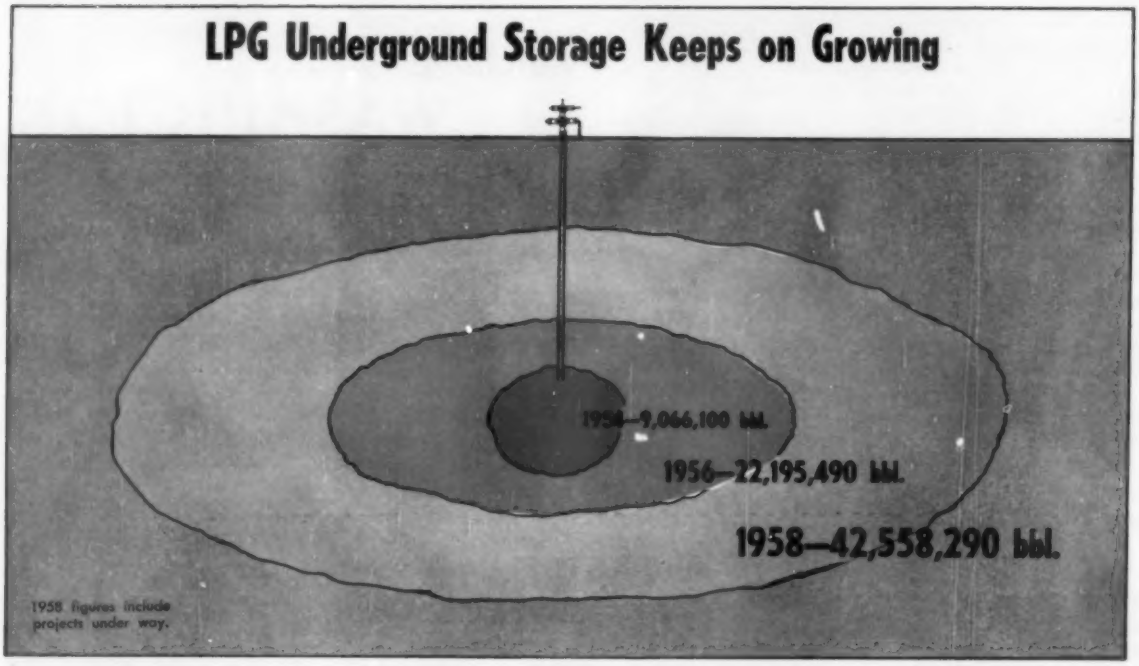
• Next probe starts at the filling station

A NEW ROUND of investigations of the oil industry will kick off soon.

First on the list may be a Senate small business committee probe of dual distribution.

The committee has complaints from jobbers and distributors that the oil companies are competing with them for service-station business. And service station operators complain that their jobbers are competing with them at the motorist's gas tank.

If inquiry shows that the little fellows are being hurt, the committee will urge the new Congress to do something about it.



Growing Storage to Help LPG Pricing

Robert Bixal
District Editor

THE NATION'S LPG industry should enjoy a firm price structure this winter, thanks to two trends which have developed since last year.

The trends:

. . . A decrease in inventories of LPG and LRG totaling 112,096,000 gal. since August 31, 1957.

. . . An increase of storage capacity in the last 12 months totaling 8,671,290 bbl.

This situation—low stocks at the start of the heating season and ample storage capacity—means that LPG manufacturers generally won't be forced to dump supplies onto the market should a warm winter reduce fuel demand. They can run excess production to storage and avoid ruining prices.

At the same time, should demand spurt because of an early, cold winter, the relatively short supply should put prices on the firm to rising side.

A look at stocks . . . The drop in stocks is a development which stemmed from a late spell of cold weather last January and February.

Previous to that, weather in the fuel-heating areas had been moderate. Stocks of LPG exceeded the year earlier, and marketers feared they would close out the heating season with burdensome inventories.

Instead, heavy demand pulled stocks in February far below the year earlier, and the trend extended through March. Manufacturers since have built up stocks steadily, but they never have reached the 1957 volume.

Only regions where LPG stocks are higher now than last year are the Mid-Continent and Rocky Mountains. At the start of this month, stocks in the Mid-Continent totaled 109,573,000 gal. compared to 90,762,000 gal. last year. In the Rockies, stocks this year totaled 12,740,000 gal. compared to 10,084,000 gal. last year.

Biggest drawdown has occurred in West Texas and New Mexico. Present stocks in that area total 291,685,000 gal. They were 400,688,000 gal. last year.

Stocks over the nation currently amount to 862,176,000 gal. against 974,272,000 gal. at the same time a year ago.

And storage grows . . . The trend to more storage capacity is nothing new to the industry.

Construction of new storage caverns has been at a high level for nearly a decade now. The important aspect of this building, however, is that it shows little signs of slacking off. LPG producers and distributors alike are making more room for products not only in the southwest but also in the north and east near the big markets.

Despite the general economic slump, the industry is pouring millions of dollars into new projects. Since last fall alone, 8,671,290 bbl. has been added or is currently being added to storage capacity.

When the projects which are now actually under way are completed, storage will top 42,558,000 bbl. This is a big 20% increase over last year's figure of 33,887,000 bbl., and nearly double the capacity for 1956.

Reprints Available

THIS is the fifth annual survey of LPG underground-storage capacity presented exclusively by The Oil and Gas Journal.

Each company polled by the Journal sent complete figures for its own projects. As a result, the table on pp. 41-42 represents actual capacities for every known LPG cavern in the United States.

Reprints of this article, together with the Journal survey of underground storage capacity for natural gas (OGJ, May 12, p. 84) are available at 50 cents each. Address Reader Service, The Oil and Gas Journal, Box 1260, Tulsa.

Here's a Complete Rundown on Underground LPG Storage

County and type of storage	Capacity* (in barrels)	Product
Alabama		
Tuloma Gas Products Co.—Sinclair Oil & Gas Co.		
Marengo—Mined chalk	140,000	B-P-mix
Marengo—Mined chalk	225,000	Propane
California		
Standard Oil Co. of California		
Los Angeles—Water sand	150,000	Propane
Los Angeles—Water sand	150,000	Butane
Los Angeles—Water sand	100,000	Propylene
Sunray Mid-Continent Oil Co.†		
Los Angeles—Oil sand		Propane
Georgia		
Atlanta Gas Light Co.‡		
Various counties—Buried tank	87,700	Propane
Illinois		
National Petro-Chemicals Corp.		
Douglas—Mined shale	170,000	Propane
Phillips Petroleum Co.		
Kankakee—Mined shale	260,000	Propane
Warren Petroleum Corp.		
Kane—Mined shale	44,000	LPG
White—Mined shale	52,000	LPG
Indiana		
Northern Indiana Public Service Co.§		
La Porte—Mined shale		Liq. pet.
Kansas		
Cities Service Oil Co.		
Reno—Salt layer (4 caverns)	235,000	Butane
Reno—Salt layer (6 caverns)	445,000	Propane
National Cooperative Refinery Association		
McPherson—Salt layer (3 caverns)	160,000	Propane
McPherson—Salt layer (13 caverns)	558,000	Butane
Pan American Petroleum Corp.		
Grant—Salt layer (7 caverns)	173,000	LPG
Phillips Petroleum Co.		
Kingman—Salt layer (3 caverns)	228,000	Butane, propane
Skelly Oil Co.		
McPherson—Salt layer (12 caverns)	459,000	Propane
Tuloma Gas Products Co.		
Reno—Salt bed (under construction)	150,000	Propane
Kentucky		
Columbia Hydrocarbon Corp.		
Greenup—Mined cavern (under construction)	210,000	Propane
Greenup—Mined cavern (under construction)	80,000	Butane
Louisiana		
Cities Service Refining Corp.		
Cameron—Salt dome	482,000	Butane
Cameron—Salt dome	392,000	Propane
Esso Standard Oil Co.		
Ascension—Salt dome	225,000	Butane
Ascension—Salt dome	150,000	Isobutane
Ascension—Salt dome	150,000	Propane
Ascension—Salt dome	250,000	Propylene
Ascension—Salt dome	300,000	Ethylene
General Gas Corp.		
Bienville—Salt dome	179,000	Propane
Bienville—Salt dome	131,000	Butane
Bienville—Salt dome	190,000	B-P mix
Petroleum Sales, Inc.		
Evangeline—Salt dome	200,000	B-P mix
Evangeline—Salt dome	75,000	Propane
Evangeline—Salt dome	60,000	Butane
Warren Petroleum Corp.		
Bienville—Salt dome	260,000	LPG
St. Landry—Salt dome	155,000	Propane
Maryland		
Washington Gas Light Co.‡		
Montgomery—Buried tanks	45,240	Propane
Michigan		
Cities Service Oil Co.		
Kent—Salt layer (4 caverns)	470,000	Propane
Skelly Oil Co.		
Kent—Salt layer	145,000	Propane
Sun Oil Co.		
Wayne—Salt layer (2 caverns)	180,000	Propane
Wayne—Salt layer (2 caverns)	170,000	Butane
Mississippi		
Anchor Petroleum Co.		
Forrest—Salt dome	250,000	Propane
Forrest—Salt dome	250,000	LPG
Forrest—Salt dome	250,000	Butane
General Gas Corp.		
Forrest—Salt dome	24,000	B-P mix
Forrest—Salt dome	24,000	Propane
Skelly Oil Co.		
Forrest—Salt dome	190,000	Propane
Forrest—Salt dome	62,000	Butane
Warren Petroleum Corp.		
Forrest—Salt dome	1,000,000	LPG
New Jersey		
Esso Standard Oil Co.		
Union—Mined shale (nearing comp.)	300,000	Propane
Union—Mined shale (nearing comp.)	375,000	Butane
New Mexico		
Atlantic Refining Co.		
Lea—Salt layer	50,000	Butane
Lea—Salt layer	50,000	Propane
El Paso Natural Gas Co.		
Lea—Salt layer (2 caverns)	92,000	LPG
Sacra Bros.		
Eddy—Salt layer (2 caverns)	51,000	Propane
Eddy—Salt layer	24,000	LPG
Skelly Oil Co.		
Lea—Salt layer (2 caverns)	120,000	Propane
Lea—Salt layer	80,000	Butane
Warren Petroleum Corp.		
Lea—Salt layer	171,000	LPG
New York		
Anchor Petroleum Co.		
Steuben—Salt layer (3 caverns)	450,000	Propane
Steuben—Salt layer	120,000	Butane
Suburban Propane Gas Corp.		
Cortland—Salt layer	250,000	Propane
Ohio		
Standard Oil Co. (Ohio)		
Allen—Mined shale (2 caverns)	60,000	Propane
Texas Eastern Transmission Corp.		
Butler—Mined shale (under const.)	300,000	LPG
Oklahoma		
Carter Oil Co.		
Pontotoc—Abd. oil wells	175,000	LPG
Shell Oil Co.		
Beckham—Salt layer	15,000	Propane

A survey by The Oil and Gas Journal shows nine new caverns are currently being developed. A dozen more are in the planning stage.

More significant than the number are the types of projects and their locations. The trend is toward man-made caves carved out of shale, chalk, or granite in the eastern part of the country where salt formations like those found in the Southwest are hard to come by.

Why the boom . . . The gigantic growth in LPG underground storage has come about in the amazingly short span of 8 years.

Since then, this type of comparatively cheap storage has become a key factor in the stability of the LPG industry. It has meant a firmer supply

Underground LPG Storage (con't)

County and type of storage	Capacity* (in barrels)	Product
Oklahoma (continued)		
Sinclair Oil & Gas Co.		
Seminole—Mined shale	110,000	Propane
Pennsylvania		
Sun Oil Co.		
Delaware—Granite cavern (nearing completion)	250,000	Butane
Texas		
Anchor Petroleum Co.		
Martin—Salt layer (4 caverns)	300,000	Propane
Martin—Salt layer (2 caverns)	140,000	LPG
Bay Petroleum Corp.		
Chambers—Salt dome (5 caverns)	1,250,000	Butane, propane
Cities Service Oil Co.		
Cochran—Salt layer	25,000	Propane
Cochran—Salt layer	10,000	Butane
Gray—Salt layer (2 caverns)	200,000	Propane
Gray—Salt layer	85,000	Butane
Midland—Salt layer	50,000	LPG
Continental Oil Co.		
Reagan—Salt layer	46,000	Propane
Cosden Petroleum Corp.		
Howard—Salt layer	50,000	Alky. feed
Howard—Salt layer¶	30,000	Nat. gaso.
Dorchester Corp.		
Carson—Salt layer	55,000	Propane
Carson—Salt layer	35,000	Butane
Dow Chemical Co.		
Brazoria—Salt dome	500,000	Propane
El Paso Natural Gas Co.		
Ector—Salt layer (4 caverns)	35,000	LPG
Reagan—Salt layer (10 caverns)	820,000	LPG
Enterprise Petroleum Gas Co.		
Wood—Salt dome (2 caverns)	240,000	Butane
Freestone Underground Storage Corp.		
Freestone—Salt dome	150,000	Propane
Freestone—Salt dome	70,000	B-P mix
Gulf Oil Corp.		
Howard—Salt layer (2 caverns)	103,500	Raw product
Jefferson—Salt dome (2 caverns)	410,000	Ethylene
Jefferson—Salt dome	160,000	Propane
Jefferson—Salt dome	307,000	Butane
Jefferson—Salt dome	67,000	LPG
Humble Oil & Refining Co.		
Waller—Gas sand	500,000	Butane
Waller—Gas sand	1,000,000	Ethane, propane
La Gloria Oil & Gas Co.		
Jim Wells—Sand (2 projects)	75,000	Butane
Jim Wells—Sand (2 projects)	100,000	Propane
Lion Oil Co.		
Scurry—Salt layer (6 wells)	477,000	Propane
Scurry—Salt layer (2 wells)	136,000	Butane
Magnolia Petroleum Co.		
Liberty—Salt dome	2,100,000	Butane, propane
Midland—Salt layer	100,000	LPG
Pan American Petroleum Corp.		
Andrews—Salt layer (2 caverns)	135,000	Propane
Andrews—Salt layer	49,000	Butane
Ector—Salt layer (2 caverns)	111,000	Propane
Hockley—Salt layer (2 caverns)	159,000	Propane
Hockley—Salt layer	28,000	Butane
Pecos Company		
Midland—Salt layer (4 caverns)	200,000	LPG
Phillips Petroleum Co.		
Brazoria—Salt dome (3 caverns)	1,482,000	Butane, propane
Ector—Salt layer	230,000	Propane
Hutchinson—Salt layer (12 caverns)	2,868,000	Butane, propane
Pure Oil Co.		
Andrews—Salt layer (3 caverns)	275,000	Propane
Jefferson—Salt dome	200,000	Butane
Reef Fields Gasoline Corp.		
Howard—Salt layer (4 caverns)	193,000	Propane
Howard—Salt layer (2 caverns)	82,000	Butane
Shamrock Oil & Gas Corp.		
Moore—Oil sand	1,300,000	B-P mix
Shell Oil Co.		
Ector—Salt layer	365,000	Butane
Yoakum—Salt layer (2 caverns)	500,000	Propane
Sid Richardson Gasoline Co.		
Winkler—Salt layer (3 caverns)	369,000	Propane
Winkler—Salt layer (brine well)	70,000	.....
Winkler—Water sand‖	.....	Butane, propane
Skelly Oil Co.		
Carson—Salt layer (3 caverns)	235,000	Propane
Carson—Salt layer (2 caverns)	148,000	Butane
Southern Minerals Corp.		
Nueces—Oil sand	85,000	B-P mix
Standard Oil Co. of Texas		
Scurry—Salt layer (4 caverns)	121,000	Propane
Scurry—Salt layer	22,500	Butane
Sun Oil Co.		
Jefferson—Salt dome	.....	Butane
Sunray Mid-Continent Oil Co.		
Scurry—Salt layer (3 caverns)	97,500	Propane
Scurry—Salt layer	16,850	Butane
Texas Butadiene & Chemical Corp.		
Chambers—Salt dome (5 wells)	1,700,000	Butane
The Texas Co.		
Hardin—Salt layer (4 caverns)	475,000	Butane
Scurry—Salt layer	92,000	Propane
Texas Natural Gasoline Corp.		
Chambers—Salt dome (3 caverns)	500,000	Butane
Glasscock—Salt layer	150,000	Butane
Harris—Salt dome (2 caverns)	650,000	Butane
Harris—Salt dome	500,000	Propane
Upton—Salt layer (4 caverns)	525,000	Propane
Upton—Salt layer (3 caverns)	375,000	Butane
Tuloma Gas Products Co.		
Fort Bend—Salt dome (under const.)	312,000	Butane
Wanda Petroleum, Inc.		
Harris—Salt dome (2 caverns)	300,000	Butane
Warren Petroleum Corp.		
Chambers—Salt dome	3,400,000	Nat.-gas liquids
Crane—Salt layer (2 caverns)	164,000	Propane
Smith—Salt dome	950,000	LPG
Stephens—Mined shale	48,000	LPG
Wisconsin		
United Petroleum Gas Co.		
Pierce—Mined and sealed sandstone (under construction)	100,000	Propane
TOTAL	42,558,290	

*Includes projects under construction. †Combination storage and miscible-phase displacement project. ‡Does not include aboveground storage. §Project temporarily postponed. ¶Not included in total. ‖Available but used only in emergency.

and a more stable flow during peak winter demand. It has also had a steadying effect on the price structure.

Storage is indispensable for a market as fast-growing as LPG. Sales climbed to nearly 7 billion gallons in 1957, a 4.6% gain over the previous year. In 1956, the percentage gain was 8.4% (OGJ, Sept. 1, p. 114).

Most of the capacity is concentrated in salt domes and salt layers in the Southwest. Texas is the prime storage state, with capacity of more than 29,000,000 bbl. Future increases are virtually assured in the impervious and easily washed salt formations found in Texas.

This type of storage is by far the cheapest, with initial cost averaging about $2 per barrel. In contrast, it

costs an estimated $25 per barrel to use steel tanks for aboveground storage.

Where salt formations are not present, the industry is doing the next best thing: Digging caverns out of shale, chalk, and granite. The cost varies, depending on size, but estimated cost of shale and chalk caverns is about $4 to $7 per barrel.

Projects under way . . . Here's a quick look at who's developing new storage caverns and where:

. . . Sun Oil Co. is building the nation's first LPG granite storage cavern at its Marcus Hook refinery in Pennsylvania. It will hold 250,000 bbl. of butane when completed in November (See cover photo).

Sun cites these advantages: It will cut costs of storing butane as much as 50 to 80%. Less surface area is required. And it's safer. An interesting byproduct is the blasted-out rock. Sun is saving thousands of dollars by using the rock on other refinery projects.

Sun's experiment in hard-rock excavation began in 1954 after 3 years of investigation. As in most similar caverns, a wide shaft is drilled, in this case to 307 ft. Fenix & Scisson, Inc., Oklahoma contractors, began widening the cavern with dynamite. Then bulldozers were lowered piece by piece and reassembled in the hole.

. . . Esso Standard Oil Co. is nearing completion at its big shale caverns at the Bayway refinery in New Jersey.

The propane cavern will hold 300,000 bbl. and will be ready in November. The 375,000-bbl. butane bin will be ready about the end of the year.

Esso says these caverns are the country's largest man-made storage caverns and the first mined caverns for storage of petroleum products on the East Coast.

. . . Texas Eastern Transmission Corp. will complete the first phase of its new project near Lebanon, Ohio, next summer. The initial phase will hold about 300,000 bbl. of LPG. But the 89-acre tract is big enough for at least 1,000,000 bbl. additional storage, which may be built in the future.

The product will come from the recently reconverted Little Big Inch products line from the Gulf Coast (OGJ, Aug. 25, p. 43). The terminal, known as Todhunter, will supply a primary truck market for a radius of 150 miles, and a secondary rail market to New England states.

. . . Columbia Hydrocarbon Corp., one of the Charleston Group companies of Columbia Gas System, Inc., is building two shale caverns at Siloam in eastern Kentucky. One will hold 210,000 bbl. of propane, and the other 80,000 bbl. of butane.

The storage facilities are part of a $13,000,000 project by the Charleston Group companies along the Kentucky-West Virginia border. Scheduled for completion in December are hydrocarbon-extraction facilities at Kenova, W. Va., and a fractionation plant at Siloam. Facilities to produce ethylene at the fractionation plant will be added later.

In addition to these projects, United Petroleum Gas Co. is building a propane storage facility in Pierce County, Wisconsin. The mined cavern will ultimately hold 100,000 bbl.

More salt-cavern projects are also under way. Tuloma Gas Products Co. is developing salt-dome storage in Fort Bend County, Texas, with capacity of 312,000 bbl. of butane. And in Kansas, Tuloma will be able to store 150,000 bbl. of propane in a new salt-bed cavern in Reno County.

Other plans . . . Several other companies have plans for the future.

Cosden Petroleum Corp. will expand its Howard County, Texas, facilities with three more salt-layer caverns capable of holding 50,000 bbl. of propane, 50,000 bbl. of isobutane, and 100,000 bbl. of butane.

In Rhode Island, Suburban Propane Corp. has plans for a 300,000-bbl. shale cavern in Newport County. Storage product would be propane.

Underground Storage & Exploration, Inc., plans to develop six 2,000,000-bbl. shale caverns near Mauch Chunk in eastern Pennsylvania (OGJ, Oct. 14, 1957, p. 102). The first cavern is scheduled for 1960, with one per year the following 5 years. The same company plans to develop a 400,000-bbl. cavern near Moundsville in eastern West Virginia.

Canada . . . Steelman Gas, Ltd., is developing western Canada's first major LPG storage facility in Saskatchewan.

The project, near Melville, will include two storage wells, each with ultimate capacity of 100,000 bbl. The company tentatively plans to drill two more storage wells, bringing total capacity to 400,000 bbl. The storage formation is salt.

Propane from the company's plant at Steelman will be hauled 115 miles to the storage area in railway tank cars. The company said the storage site is well situated to serve potential markets in northern and central Saskatchewan and northwestern Manitoba.

While this will be the first major storage in western Canada, across the country in Sarnia, Ontario, several LPG storage facilities are in operation. They include Sun Oil Co.'s three salt-layer caverns with capacity for 300,000 bbl. of butane, and Imperial Oil's two salt-layer caverns with capacity for 80,000 bbl. each.

LPG Underground Storage Capacity . . . by states*

	(In barrels)		
Alabama	365,000	New Jersey	675,000
California	400,000	New Mexico	638,000
Georgia	87,700	New York	820,000
Illinois	526,000	Ohio	360,000
Kansas	2,408,000	Oklahoma	300,000
Kentucky	290,000	Pennsylvania	250,000
Louisiana	3,199,000	Texas	29,079,350
Maryland	45,240	Wisconsin	100,000
Michigan	965,000		
Mississippi	2,050,000	**TOTAL**	**42,558,290**

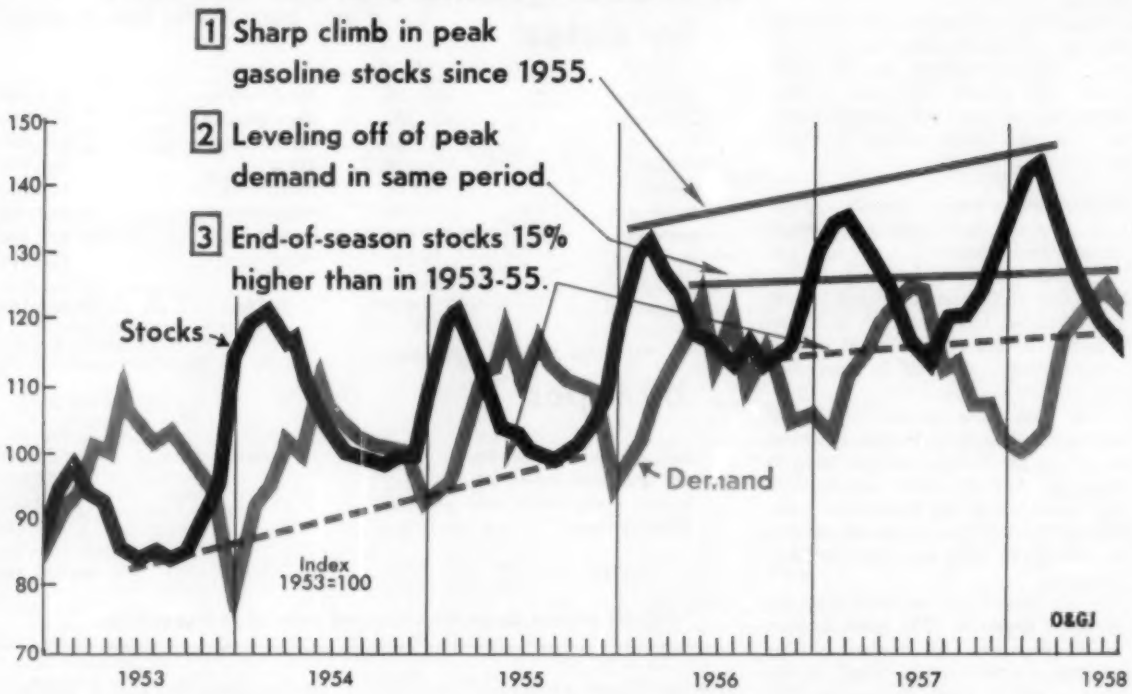
*Includes projects under way.

. . . by types*

	Barrels
Salt domes and salt layers	36,066,350
Oil, gas, and water sands	3,635,000
Mined shale, chalk, and granite	2,724,000
Miscellaneous†	132,940
TOTAL	**42,558,290**

*Includes projects under way. †Buried tanks of two companies.

You can trace the soft gasoline market to:



Need Grows for Throttled-Down Runs

REFINERS can blame their weak gasoline prices the last 3 years on one major fact: They persist in making too much gasoline for the demand.

Not only that, refiners have failed to react quickly enough in advance to the seasonal factors that should determine production trends in their business.

The oversupply is shown clearly and simply in the chart above. But the explanation of why refiners continue to overproduce their markets is not so easy. Basically, however, it involves prices, gasoline yields, and plant capacities.

Familiar story . . . First, let's examine what's happening to the age-old interplay of supply and demand.

Gasoline stocks have climbed to higher and higher peaks in the spring during the last 3 years. And starting with 1956 the stocks have not been drawn down to normal levels by the end of the summer.

Stocks of gasoline normally reach the high point of the year by the end of March. But this peak took a big jump in March 1956 over the year previous. A similar boost occurred in 1957 and again in 1958. (For stock changes by districts, see p. 133).

Rise of Gasoline Stocks

	Av. demand 1,000-b/d	Index*	Av. stocks 1,000-b/d	Index*
1953	3,406.8	100	150,074	100
1954	3,464.8	101.7	164,227	109.4
1955	3,745.2	109.9	164,380	109.5
1956	3,850.6	113.0	183,256	122.1
1957	3,920.8	115.1	191,138	127.4

*1953 = 100.

So what happens? Each year that a new gasoline stock record is set in March, some refiner takes a look at the national total. He gets a bit uneasy and decides he should move a little motor fuel before someone gets panicky and breaks the market. A few others make the same decisions, and the race to dump is on before the heavy season for gasoline starts.

Demand will usually catch up with the market by June. But by then the motoring season may be half gone before gasoline prices are back to summer normal.

A similar chain of events occurs in late summer—at least for the last 3 summers. Gasoline stocks in these 3 years have leveled off at the end of the motoring season well above the totals reported for 1953-55. In fact, as the chart shows, these late summer lows have been about 15% higher than in 1954 and 1955.

Again, some refiner finds he has more gasoline on hand than he had planned for the end of the season. Distillate stocks are increasing. His clean storage is crowded. So he pushes his gasoline sales hard.

The result is that the heavy offerings on a market featured by dwindling demand softens prices even more than normal. The usual end-of-the-season market uncertainties are aggravated.

The explanation . . . Several developments explain why gasoline stocks are remaining high at the end of the summer.

Just a few:

. . . **Summer demand** has failed to show gains for the past 2 years.

Total gasoline demand in June 1956 was 4,312,000 bbl. daily. In 1957, July was the top month with 4,286,000 bbl. daily average. Preliminary figures for 1958 indicate July again is the peak month with an average of about 4,290,000 bbl. daily.

The failure of summer peak demand to increase contradicts the trend of average annual demand which has been rising since the end of World War II. Average annual demand in 1953 was 3,406,800 bbl. daily and had increased to 3,920,800 bbl. daily in 1957.

. . . **Refinery runs** have remained at high levels during the summer months.

This tendency has prevailed even though demand for total petroleum products is less in summer than during the winter months. A partial explanation likely lies in excess refining capacity now available in this country.

It's a great temp[illegible] these days for a refiner to ri[illegible]plant as near capacity as possible. [illegible] achieves a lower unit cost. An[illegible]n though he may have to run h[illegible] products into storage, the refiner may figure the ultimate profits made because of the lower costs will justify carrying heavy inventories.

When this situation is multiplied time and again, it's easy to understand the heavy crude runs in summer.

. . . **Yields of gasoline** from a barrel of crude also have been increasing to complicate the gasoline-stock situation.

In many cases, the basic reason for higher yields is present low refinery realization. When low prices reduce the refiner's income from a barrel of crude, the tendency is to make up part of the loss by turning more crude into gasoline, the highest priced major product.

This also becomes a vicious circle, however. With every refiner following the same high-yield plan, too much gasoline results. This pressures the price still lower and brings total realization down rather than up.

The only solution for the refiner is keep his stocks closer in line with demand. How he has failed to do this is made clear in the table. Using 1953 average demand and stocks as 100 on an index, demand by 1957 had increased to 115.1 while stocks had jumped to 127.4.

The table reveals that 1955 was a year of correction when demand and stocks were nearly in balance—such a correction is again the big need.

The JOURNAL Said . . .

50 years ago

October 6, 1908

A letter from Mexico states that American oil operators from Indiana, Pennsylvania, Illinois, Kansas, Oklahoma and Texas are pouring into the Tampico (Mexico) region and vast tracts of prospective oil lands are being leased by them and preparations made for developing the properties.

The phenomenal oil well and fire in the San Geronimo field, 75 miles southwest of Tampico, served to awaken widespread interest in Mexico as a country of immense possibilities in oil production.

President J. S. Cullinan of The Texas Co. returned to Houston October 3 after a trip of several weeks in the north and east.

25 years ago

September 28, 1933

Fuel savings as high as 29.6% are revealed by motor tests of high compression ratios conducted by engineers of the Ethyl Gasoline Corp.

A large six-cylinder commercial engine, of the type which must carry heavy loads over steep grades, was employed for the trials. Data were obtained over a range of loads at constant speed and two compression ratios, 4:03 to 1 and 5:48 to 1.

Secretary Ickes issued a general statement concerning the execution of the oil industry code, declaring that the selling of gasoline below cost must be stopped.

Gasoline not only is the cheapest commodity the American public buys today but its relative price has been below that of all other necessities for 20 years and longer, according to United States government figures.

10 years ago

September 30, 1948

A recommendation that domestic oil production be cut back by 20% to provide an underground petroleum stockpile to be drawn upon in the event of war has been laid before the National Security Resources Board by Wallace Pratt, former petroleum consultant to Board Chairman Arthur M. Hill.

Effective September 28, the Phillips Petroleum Co. announced from its Bartlesville, Okla., headquarters a 35-cent per barrel advance in all grades of crude oil which it purchases in Texas, Oklahoma, Kansas, and Arkansas.

Another step by the Communist-dominated Hungarian Government to take over all oil activities within its border came to light early this past week when two officials of the Standard Oil Co. (N. J.) affiliate there were arrested for allegedly "sabotaging" the company's crude-oil production.

MAORT's (Jersey's) oil fields were seized by the Russians in the spring of 1945 and they have retained control since then despite protests by the U. S. Department of State.

Tulsa Move Delays Oil Trial

THE GOVERNMENT'S price-fixing suit against 29 oil companies won't reach the actual trial stage for some months—probably late winter.

But when trial is held, it will be in Tulsa instead of Alexandria, Va., where a federal grand jury returned a one-charge indictment against the companies (OGJ, June 9, p. 68).

Judge Albert V. Bryan of the Alexandria federal district court will formally transfer the case to Tulsa this week. It will be heard there, probably, by Judge Royce Savage of the northern district of Oklahoma.

Transfer of the case evened the score between the Government and the companies. The Justice Department won the first round when Judge Bryan refused to dismiss the case (OGJ, Sept. 15, p. 118).

The department bitterly opposed the shift of the trial. It contended that Alexandria was just as convenient for the defendants and more so for itself.

Joseph McDowell, chief government counsel, even pleaded "personal inconvenience." On a similar occasion, he told Judge Bryan, he was "stuck" in Buffalo for 2 months—"until I could pay my own way home."

The defendants argued that trial in Alexandria would be an inconvenience and hardship on them. And Judge Bryan, who faces the prospect of a number of school-desegregation cases, was interested in the fact that the Madison case ran for 4 months and led to a change in the rules of procedure to prevent defendants being hauled all over the country at the whim of the Government.

Justice demands it . . . Transfer of the case, Judge Bryan held, "is uncompromisingly demanded in the interest and furtherance of justice."

Judge Savage was in Washington at the time the decision was made. He is believed to have conferred with Judge Bryan before the motion moving the hearings to Tulsa was granted.

Actual shift of the case will not be made until the records submitted to the Alexandria grand jury are processed by the Justice Department. Thereafter, there will still be some preliminary motions to be heard and decided before Judge Savage can set a date for actual trial. Judge Savage says it would be impossible for the trial to start before January 1.

Import Ideas Show Rift

. . . in industry ranks. Federal officials disappointed by jockeying for advantage revealed in suggested changes.

SUGGESTIONS for improving the proposed 1959 import-control program are beginning to pile up.

A large number of importers, refiners, and domestic producers plan to accept the invitation of Capt. M. V. Carson, Jr., imports administrator, to send in ideas for bettering the plan, made public September 9.

These recommendations will be studied by Carson and the experts on his staff. Then he will make a report to the cabinet fuels committee, outlining any changes he thinks should be made in the program.

Carson hopes in this way to find and work out any "bugs" buried in the plan as now written.

The administrator's aim is to get a program that will be generally acceptable. But there is little chance that anything he works out will be satisfactory to all the conflicting interests involved.

The recommendations to Carson already are seen as mostly falling under one or another of a number of headings. Here are some of them already disclosed:

. . . **Provide quotas** only for companies with foreign investments or an historical pattern of imports.

. . . **Limit quotas** to importers who will process the foreign oil in their own refineries.

. . . **Make the program** nation wide from the start, instead of only east of the Rocky Mountains.

. . . **Extend import** controls across the board, to include finished products.

. . . **Shorten** or cut out the transition period to get all importers on the same percentage level quickly.

. . . **Give small** refiners preferential treatment similar to that provided by the set-aside of the Military Petroleum Supply Agency.

. . . **Cut out or limit** the preference given certain types of imports, such as asphaltic crudes.

. . . **Increase** the preference given asphaltic crudes.

. . . **Reduce** the overall level of imports below the 826,300-bbl. figure now proposed.

. . . **Buttress** the program with stiff enforcement provisions.

. . . **Drop the voluntary** import control in favor of a high import tariff.

The objections to quotas for all refiners come mainly from companies with foreign operations. They don't like the idea of selling foreign oil to refiners who can't use it themselves, and then buying it back after it reaches this country.

On the other hand, refiners with no foreign holdings strongly favor extending controls to finished products. They foresee foreign operators, limited as to the amount of crude they can bring in, offsetting a portion of their quota cuts by higher product imports.

Producers, aside from their rift over whether imports should be controlled by quota or high tariff, also favor control of products. Their contention is that a barrel of foreign product displaces considerably more than a barrel of domestic crude.

But producers urge also that the import level be kept strictly to the 1954 ratio. And they are against "loopholes" such as the credit for foreign crude processed for asphalt.

The idea of channeling more imports through the small refiners is getting the support of the Small Business Administration, which urged and helped secure the military set-aside.

Government's reaction . . . Import officials reportedly are disappointed in what they have received so far.

They had hopes that from somewhere in the industry they would get a complete outline of a new program, dealing with the various aspects of the problem as laid down in the government draft.

All that is coming in, one official complained, is suggestions that changes be made to improve the position of some particular segment of the industry. But no plan has been offered so far for revising other parts of the program that would be affected by such changes.

The possibility has been raised that after reviewing all the views that will be submitted in the next 2 weeks, Carson will call a short public hearing at which the various groups can outline their ideas as to what should be the general outline of the new program. Such a hearing was held last year, before the import control program for District 5 was written.

Delta Buys Texas Properties

DELTA OIL CO., Albuquerque, N. M., has announced plans to enter the exploration and production business following the purchase of oil-producing properties near Houston.

The company bought interests in 15 producing wells and some 2,000 undeveloped acres in Harris, Fort Bend, and Washington counties from William T. Jones, Houston. The transaction, involving both cash and Delta stock, makes Jones the company's largest individual stockholder.

Primarily a holding company, Delta owns interests in more than 200 gas wells in San Juan basin. It also holds leases on approximately 80,000 acres in the Four Corners area. Jones will be head of the Texas operations for Delta, with headquarters at Houston. President of the company is T. J. Doerrie. Delta was preparing last week to drill its first wildcat, a 6,200-ft. test northwest of Farmington, N. M. Plans also were announced for future wildcat drilling in Utah and Colorado.

TGT Seeks Market

outlet in deal for control of East Coast wholesaler.

TENNESSEE Gas Transmission Co. has taken a bold step to expand its wholesale marketing facilities on the Eastern Seaboard.

Through a multimillion-dollar exchange-of-stock offer, the company has bid for controlling interest in Hartol Petroleum Corp., big East Coast wholesale marketer.

Holders of virtually all the outstanding stock of Hartol have accepted Tennessee's offer of 81 shares of TGT for each share of Hartol. The deal is understood to be contingent on fulfillment of certain conditions laid down by TGT.

The transaction would involve more than 467,000 shares of TGT stock. Value of the stock on the current market is approximately $15,000,000.

A Hartol announcement indicated the company and its subsidiary, Atlantic Coast Terminal, Inc., would retain their corporate names, management, and policies.

Hartol, founded in 1923, is an independent wholesaler of petroleum products. It distributes gasoline, kerosine, and fuel oil. The company owns and operates deep-water terminals in the Boston, New York, and Baltimore harbor areas.

The Hartol facilities would provide an important outlet for products from the 25,000-bbl. New Orleans refinery operated by Bay Petroleum Corp., a TGT subsidiary. Bay Petroleum and its subsidiary, Speed Products Co., now market products through about 240 service stations in the Rocky Mountain and Southeastern states.

Tax Challenged

by railroad in suit seeking refund of Colorado's levy.

ANOTHER LEGAL attack has been made on Colorado's severance tax—this time by the Union Pacific Railroad, large oil producer in Rangely field.

The railroad filed suit in Denver district court claiming the tax is unconstitutional and discriminatory. Union Pacific asked refund of $385,235 paid under protest in 1953, when the levy was enacted, and 1954, plus one-half per cent interest per month on each payment.

Union Pacific attorneys will file other refund demands later with the Colorado Revenue Department for taxes paid in years following 1954.

The suit is similar to action taken by The California Co., largest Rangely producer, to recover more than $900,000 in severance payments. Denver District Judge Edward Keating ruled last February 15 in that case that the tax is legal. Calco now has an appeal in the Colorado Supreme Court.

Defendants in the latest suit are the state of Colorado, Revenue Director Robert Theobald, and State Treasurer Homer Bedford.

The tax imposes a graduated 2 to 5% levy on gross income from oil-gas production. Union Pacific pays the maximum 5% and charged the law discriminates against it as a large operator.

"It is unconstitutional that some persons pay at minimum rate while others pay at high rate," the suit contended. "There is no reason for creating a class of taxpayers consisting solely of persons and companies deriving their income from production and extraction of oil and natural gas."

Offshore Case Postponed

ARGUMENTS before the U. S. Supreme Court on seaward boundaries of the Gulf Coast states have been indefinitely postponed.

The Government's suit asserting title to the submerged oil and other resources of the Gulf of Mexico beyond the 3-mile line was scheduled to be heard October 13.

The nine justices met last week to discuss the calendar for the term which opens October 6. They announced that the boundary suit would be put off "until further order."

All five gulf states are parties to the suit. The case is the last step in the Government's long campaign for control of submerged mineral resources off the Continental Shelf beyond the 3-mile limit.

Kenai Test Planned

near Richfield acreage by Halbouty and King Oil.

TWO Texas independents have teamed up to drill a wildcat on Alaska's Kenai Peninsula.

Michel T. Halbouty, Houston operator, has reached an agreement with King Oil, Inc., Wichita Falls, for development of a block of more than 5,000 acres there. King Oil, headed by R. A. King, acquired the acreage through a farmout.

The acreage lies about 3½ to 7 miles from Richfield Oil Corp.'s discovery which set off the current lease boom in Alaska.

Halbouty will be operator. Road building and other preliminary work will begin immediately, but the first well is not expected to be spudded at least until next March.

Another deal . . . Sunset International Petroleum Corp., Beverly Hills, Calif., has acquired half interest in approximately 72,000 acres in Copper River basin north of Anchorage.

Sunset bought the interest in the acreage from Polaris Oil Co. Tradewinds Exploration, Inc., which is owned 19% by Sunset, holds the other half of the acreage.

PROCESSING BRIEFS . . .

The State of Texas last week filed an antitrust suit in the Forty-first District Court of El Paso County charging three refiners with gasoline price fixing in the El Paso area.

The companies are The Texas Co., Standard Oil Co. of Texas, and El Paso Natural Gas Products Co. The state charges that these firms supply all gasoline consumed in the El Paso area and have conspired to maintain artificially-high tankwagon gasoline prices.

World's largest Powerforming unit of 27,000 bbl. daily capacity has gone on stream at Esso Standard Oil Co.'s Baton Rouge, La., plant. Additional facilities also on stream include a new debutanizer and splitter unit. Bechtel Corp. was contractor for all units which are part of a $46-million expansion program at the refinery.

Preliminary work has started at Vancouver, Wash., on a 15,000-bbl. refinery for Pacific Cooperatives which will cost $15 million. Crude will be delivered to the refinery by a 1½-mile pipeline from a deep-water dock on the Columbia River. Process units to be built at the refinery still have not been revealed.

Continental Carbon Co. will expand its plant at Ponca City, Okla., to increase its furnace-black capacity by 50%.

Expansion of the carbon plant is scheduled to start within 2 months. Completion is expected by the fall of 1959. The project will expand the plant's capacity from 50,000,000 to 75,000,000 lb. annually of all grades of furnace black. The plant addition will produce premium quality furnace black from oil furnished by Continental's Ponca City refinery.

New competition to Du Pont's Dacron will result from formation of Lindum Fibers Corp., a wholly owned subsidiary of Celanese Corp. of America and Imperial Chemical Industries, Ltd. A new U. S. plant will begin producing Teron fiber with the same chemical composition as Dacron by 1960. Since Du Pont's exclusive rights to make Dacron domestically don't expire until July 1961, there is a possibility of a patent conflict.

Also for Refiners . . .

IN THE NEWS: LPG marketers may enjoy firm prices this season due to decrease in stocks and growth in underground storage (p. 40) . . . Journal study shows weak gasoline prices in last 3 years due to overproduction (p. 44) . . . Refiners have variety of suggestions for changing new imports-control plan (p. 46) . . . Government wants seven West Coast majors to drop retail marketing (p. 49) . . . Imperial's big petrochem complex at Sarnia is on stream (p. 50) . . . Work will start this year on Guatemala's first refinery (p. 52).

PLUS THESE TECHNICAL REPORTS: First pentane-isomerization unit (p. 54) . . . Planning a chemical cleaning program (p. 67).

New Tools Cut Costs

. . . for drillers and producers. Humble engineers reveal some startling developments during Denver ASME sessions.

TWO ENGINEERS of Humble Oil & Refining Co. chart this path to lower costs for drillers and producers:

. . . **Wider well spacing.**

. . . **Smaller hole diameters.**

. . . **More automatic,** small packaged production facilities.

. . . **Single and multiple** "tubingless" completions.

The engineers are Harry Pistole and Martin E. True, assistant chief petroleum engineer and division engineer respectively for Humble at Houston.

They gave their futuristic impressions to the thirteenth annual petroleum-mechanical conference of the American Society of Mechanical Engineers in Denver last week.

New tools . . . The assembled engineers heard Pistole and True describe some startling new tools and techniques like:

. . . **A "bearingless" experimental bit** which drilled 110% more hole at a 55% faster rate than conventional roller bits.

. . . **A wire-line formation tester** which can be run without pulling the bit from the bottom of the hole.

. . . **An automatic skid-mounted** production package (only 4 ft. by 7 ft.) with built-in oil, gas, and water separators and LACT equipment.

. . . **Dual and triple completions** in which tubing strings were run side by side and cemented in open hole.

Humble historically has favored wider spacing than is common in most areas. And, the company has developed many tools for completion and workover of small-diameter wells in an effort to cut down on cost of tubular goods and other well expenses.

Pistole and True reviewed the company's stand on well spacing and its recent developments in through-the-tubing permanent completion tools. But, the real surprises came in mention of new tools and techniques Humble has been working on.

Drag bit for slim holes . . . Pistole and True told the ASME that an operator (Humble) has used an "experimental bearingless bit in a conventionally sized hole."

It got a "110% increase in bit footage and a 55% increase in penetration rate over performance of conventional roller-type bits."

In answer to questions, they said that the bit was a drag type. It would be no problem to scale the bit down to slim-hole size as a roller bit is. Humble has been known to be working on drag fishtail-type bits for several years.

Pistole and True gave no indication on the stage of development of the experimental "bearingless" bit. They also said that their company had got "entirely satisfactory samples of formation fluid" from a new wireline tester. This tester, they said, is used in connection with a "special drill collar which carries the tester-packer during routine drilling operations."

"With this new tool, the company was able to take a drill-stem test of a formation at 7,000 ft. in less than 2 hours. The bit did not have to be pulled from the hole. Drilling was halted, the special drill-collar packer was expanded, and the test taken through the drill pipe.

This tester, Pistole and True said, is part of a search for a system to make possible continuous recording of formation character and content as drilling progresses.

Tubing for casing . . . The ASME was told that Humble has completed 28 wells to date in which 2½-in. oil string was set.

In these, no tubing string was needed or used. Pistole and True told the group that the resulting saving was more than 30% in many cases.

Moreover, they said, Humble has been completing wells by cementing two or more small strings side-by-side in open hole. To date, two duals and two triples have been completed in this manner, and savings in total cost has been up to 50%. In all cases, the strings were strapped together for running. Humble hopes eventually to be able to run the strings independently of each other and still be able to perforate through one string without shooting hole in the others.

Four-by-seven tank battery . . . The Humble engineers described a skid-mounted production unit.

Although measuring only 4 by 7-ft., the unit "will perform all useful functions of a standard tank battery with pipeline connection." The skid unit carries not only separation equipment for oil, water, and gas, it also has built-in equipment for LACT.

On this unit, designed to handle 300 bbl. per day of fluid, gas is taken off by a spherical separator. Water is taken off by a free-water knockout and an electrically-driven centrifuge.

An electric pump moves the oil into a dump meter or p.d. meter for measurement out of pipeline.

Pistole and True suggested that there is also a need for similar small packages for gas-compression and for water-disposal purposes.

PIPELINE BRIEFS . . .

O. R. Burden Construction Corp., Tulsa, is entering the marine pipeline-construction field for the first time on a Lake Pontchartrain crossing in Louisiana.

Burden was the successful bidder on the 27.8-mile, 30-in. crossing for United Gas Pipe Line Co., Shreveport. The lake segment is on United's southeast Louisiana-Mobile line and is part of an $18-million expansion program. Some 200 miles of 30-in. loop has been announced but only the lake section has been let. The project will be a lay-barge operation with 60-ft. joints of concrete-coated pipe weighing 32,000 lb. per joint.

American Louisiana Pipe Line Co. is seeking Federal Power Commission approval to build a 28-mile, 12-in. supply line at a cost of $1.5 million. The line would permit American Louisiana to receive gas from Pan American Petroleum Corp. in Big Lake field, Cameron Parish, Louisiana.

Northern Natural Gas Co. will seek authorization October 20 for a $3,152,700 expansion to receive an additional 250,000,000 cu. ft. daily from the affiliated Permian Basin Pipeline Co. Northern proposes 19 miles of 30-in. near Beaver, Okla., and the addition of 2,000 hp. to compressor stations at Sunray, Tex., and Beaver. Related applications by El Paso Natural Gas Co. and Permian will be heard by the Federal Power Commission at the same time.

Trans-Canada Pipe Lines, Ltd., has signed a contract to buy Medicine Hat area gas from Canadian Delhi Oil, Ltd., for a price 31% above original Alberta supply contracts. Canadian

New Conoco Plant

will make line of alcohol products from petroleum.

CONTINENTAL OIL CO. plans to build a commercial-scale plant which will use a new process for manufacturing straight-chain primary alcohols from petroleum.

Development of the new process was announced last week by Dr. John E. Kircher, general manager of Continental's petrochemical department. The company explained that the process will manufacture from petroleum a line of chemical products formerly produced only from natural oils and fats such as cocoanut and vegetable oils.

Conoco plans to market the new chemicals under the trade name "Alfol."

"The Alfols range in chain length from six carbon atoms up through 18 carbon atoms or higher if desired," Dr. Kircher said. "All contain even numbers of carbon atoms and most have been available in the past only from conventional processes using natural oils and fats as starting materials.

"Introduction of this new process based on petroleum-derived raw materials means that in the future these important chemicals will be available from a stable and economical source," he added.

The company did not elaborate on the kinds of alcohols to be produced nor the nature of the new process.

Site of the proposed plant has not been announced.

The plant is being designed on processing know-how developed by Continental's scientists and engineers at Ponca City, Okla., over a period of nearly 5 years. It is based on earlier work done by Dr. Karl Ziegler, well known German scientist.

Firms Face Threat

of losing retail business from U. S. antitrust suit.

THE FEDERAL Government is trying to force seven major West Coast oil companies out of the product retail business.

That's the chief aim of a 7-year-old antitrust suit, the Justice Department revealed last week when it filed a 25-page report in Los Angeles federal court.

Justice Department stated in its report it specifically is asking:

... **The companies cease** all retail product selling either through company-owned service stations or consignee stations.

... **The companies divest themselves** of any ownership in any service station.

The document was filed in response to a request by the court that the Government spell out what relief it was asking in the antitrust action.

Meanwhile, Federal Judge James Carter, who is hearing the preliminary phases of the case, indicated he doubted if the case could come to trial this fall as earlier predicted.

Contracts Are Let

for nearly half of Coastal Transmission's main line.

COASTAL TRANSMISSION Corp. has let contracts for building nearly half of its main line which will extend from South Texas to a point near Baton Rouge.

Oklahoma Contracting Co. will lay about 130 miles of 24-in. pipe between Lake Charles, La., and Baton Rouge. Work on this section is scheduled to start early in October.

Oklahoma Contracting also was awarded about 147 miles of 20-in. line between Robstown and Bay City, Tex. This job will get under way about mid-November.

The Baton Rouge-Lake Charles work will not include crossings of the Mississippi and Atchafalaya rivers. Separate contracts will be let for the crossings.

The Coastal system will be the western end of the line which will move Texas and Louisiana gas to downstate Florida. Eastern portion of the system will be built and operated by Houston Texas Gas & Oil Corp.

Midwestern-Walco Contractors has the contract for the Baton Rouge-Miami main line, and Harbert Construction Co. will lay lateral lines. Midwestern-Walco has three spreads in the field, headquartered at Denham Springs, La., Lacedale, Miss., and Vernon, Fla. Right-of-way clearing is under way. Pipe laying is scheduled to start this week.

Delhi will receive 13¼ cents an M.c.f. at first; with the price to reach 18¾ cents over a period of several years. The 25-year contract calls for delivery of 6,500,000 to 8,600,000 cu. ft. daily, beginning November 1, 1959.

Texas Eastern Transmission Corp. expects LPG traffic to be the most profitable phase of operating the Little Big Inch products line.

Millard Neptune, senior vice president of the company, told the Pipe Liners Club of Tulsa of this expectation for long-haul business from the Houston area to Middletown, Ohio, where deliveries will be made this year. When an underground-storage cavern has been completed at Middletown, deliveries will be made to the Dayton-Cincinnati area next year. Texas Eastern also expects to extend LPG pipeline service to the East Coast soon.

In handling refined products, the Little Big Inch Division concentrates on off-water delivery points where barge traffic is uncertain. Proposed river terminals at Cape Girardeau, Mo., and Moundsville, W. Va., have been abandoned. Refined products shipments stop at Lebanon as a result of the decision against a Moundsville terminal. A major policy decision was rejection of the idea of refining on the Gulf Coast and direct marketing in the East to assure traffic for the line.

Houston Contracting Corp. has three spreads working on 270 miles of 30 and 24-in. for Gulf Interstate Gas Co. in Louisiana, Mississippi, and Tennessee; 150 miles has been completed. Houston is winding up a 38-mile, 30-in. concrete-coated line from the Gulf Coast to Yscloskey, La., near New Orleans. Other jobs under way are 106 miles of 24-in. for Southern Natural Gas Co. in Mississippi and Alabama and a crossing of the Atchafalaya River north of Melville, La., for Transcontinental.

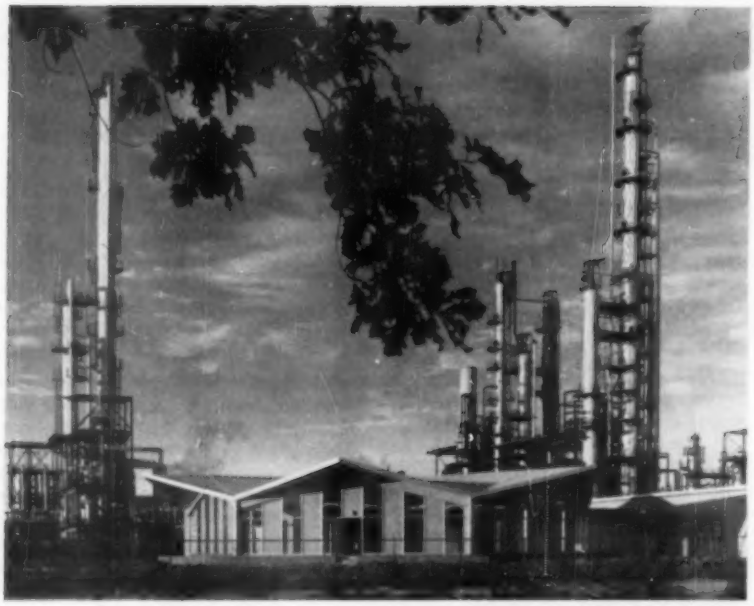
Houston will lay 62 miles of 20-in. for Shell Pipe Line Corp. from Nairn, La., to New Orleans, and 13 miles of 16-in. for Texas Gas Transmission Corp., in the Jennings, La., area, starting next month.

Also for Pipeliners . . .

IN THE NEWS: TGT may get extensive marketing outlet on East Coast in deal to acquire control of Hartol (p. 46) . . . Coastal Transmission has let contracts for half of western section of Texas-to-Florida gas line (p. 49).

A complete list of pipeline construction projects appears on page 91.

PLUS THIS TECHNICAL REPORT: Union goes automatic on new Junction-Oleum pipeline (p 87).



Petrochem Complex Finished

IMPERIAL Oil, Ltd., has completed its new $28,500,000 petrochemical plant at Sarnia, Ont.

The major expansion in petrochemical facilities gives Imperial the most versatile plant in Canada. Imperial's president, J. R. White, terms the plant unique in the variety of petrochemical raw materials it turns out. It produces ethylene, propylene, butylenes, butadiene, aromatic distillates, and aromatic tars.

White says the new plant's ethylene unit is Canada's largest, and that it has an output greater than all other Canadian plants combined.

West in Market for Lighter Oil

WEST COAST refiners have been struggling for a year with a common headache: How to meet a growing gasoline demand without overproducing for a deteriorating fuel-oil market.

William F. Kirk, manager of General Petroleum Corp.'s economics department, last week offered three suggestions for a remedy. In a speech before the Petroleum Accountants Society in Los Angeles, he urged refiners to:

... **Increase quantities of imported light-gravity crude.** This would supplement California crude oil and reduce refinery percentage yield of heavy fuel oil.

... **Bring in more refined light products** from outside areas. This would reduce runs at refineries which otherwise would be required to meet light-product demand and in the process increase fuel-oil yield.

... **Increase secondary refinery processes** to convert heavy field oil to light products. This would be an expensive and time-consuming investment.

To meet an anticipated increase in 1959 gasoline demand, Kirk said West Coast refiners will need 314,000 bbl. daily more crude than the state is currently producing. With a domestic production of 850,000 bbl. daily, the additional needed crude will probably have to come from these sources:

... **70,000 bbl. daily** from the Four Corners pipeline.

... **20,000 bbl. daily** withdrawn from excessive crude-oil inventories which hit more than 40 million barrels at mid-September.

... **224,000 bbl. daily** from foreign sources.

Kirk pointed out it is possible to increase California's current production. But this would have to come from heavy-crude fields. The oil would yield little additional gasoline and would add seriously to the 17-million-barrel surplus of heavy-fuel oil.

Fuel-oil inventories have been soaring in California. Drastic market losses to natural gas and other sources have caused fuel-oil stocks to mount to more than 33 million barrels in California as compared with 20 million a year ago. According to the most recent estimate, fuel-oil stocks continued to pile up at the rate of 45,000 bbl. daily in the first 2 weeks in September.

Richfield Supports

U. S. move to force action on Wilmington repressuring.

THE GOVERNMENT gained an unexpected ally in its injunction suit against operators in California's subsiding Wilmington oil field.

Richfield Oil Corp., one of the major operators in Wilmington, filed an affidavit of nonopposition to the suit with the federal court in Los Angeles.

The Justice Department is asking for a temporary injunction to force Wilmington operators either to come up with an acceptable repressuring program for the whole field within 60 days or to shut it in.

The Richfield position, stated by R. W. Ragland, vice president, is that the chances of unitizing the field leading to a field-wide repressuring program are virtually impossible on a voluntary basis. The injunction, according to Richfield, would spur the operators to a unit agreement in short order.

The Richfield affidavit claimed that speed is essential to save large volumes of oil and if the work is effective it must include operations of all 121 present producers. Richfield said secondary oil recovered by the flood would more than pay for the project.

FPC to Be Investigated

A HOUSE probe of industry influence on federal regulatory agencies turns this week to the Federal Power Commission.

The inquiry is being made by a House interstate commerce subcommittee headed by Rep. Oren Harris (D-Ark.), chairman of the full committee.

The group already has investigated influence peddling in the Federal Trade and Federal Communications Commission. Its disclosures led to the resignation of two federal officials, the latest being Sherman Adams. Adams resigned as assistant to the President last week. Interior Sec. Fred A. Seaton is one of several men speculated upon as a possible replacement.

U. S. Operator Spurs European Search

ONE of the most concerted efforts by an American independent to find oil abroad is now being pushed in France by D. D. Feldman of Dallas.

A Feldman subsidiary, Transworld Petroleum, S.A.F., is carrying the ball in partnership with the French company Ste. de Prospection et Exploitations Petrolieres en Alsace (PREPA). The partnership has 2,071,600 acres in the Jura, Molasse basin, and the Rhone Valley basin areas.

To keep these permits, the combine must spend at least $3,200,000 by February 1962. The partnership hopes to get another 724,000 acres in the Jura Mountain area. This would mean another $1 million in exploration outlay.

The Feldman-PREPA combine has completed 11 party months of seismic work and has had six surface geological parties in the field for a year and a half. It is now drilling its fourth wildcat. Another is planned for this year with several slated for next year.

Last week the group had its best indication of success yet with a strong gas show at a shallow test in the Rhone Valley basin area.

Feldman, who also is active in Switzerland, is doing all geological and geophysical work. PREPA is handling actual drilling.

Molasse basin . . . Drilling has been concentrated so far in the Molasse basin-Jura Mountain areas adjoining the Swiss border. The combine holds three permits in this region totalling 1,375,600 acres.

The first well, 1 Humilly, was completed at 2,970 ft. near the southern end of Lake Geneve. It was dry. The test, drilled on a seismic high, penetrated 2,500 ft. of tertiary rocks to the Urgonian lime of the Cretaceous. The second test, 1 Messery, was drilled on the east shore of the lake. It was completed dry in the Urgonian lime at 2,245 ft. after finding asphaltic bitumen on the way down.

The third well is drilling below 5,000 ft. in the Triassic due east of Lons le Saunier. Drilled on a surface structure, the well is in a different geological province. It was spudded in Jurassic sediments, older than the deepest rocks found in the first two.

The 1 Toillon topped the Triassic at 3,750 ft. It is aimed at the lower Triassic, expected at another 1,000 ft.

Provence area . . . The best show so far has been far to the south in the Rhone River valley in a shallow 2,500-ft. test on an Oligocene surface structure.

The group had a strong gas show and some oil at 475 ft. before setting surface pipe. Pipe was set at 450 ft. and testing is under way. This first test may be followed closely by several others.

The combine plans to spud its first deep test in the big Provence permit early next year. This well will probably go to 10,000 ft., testing the huge Grande Luberon structure in the eastern portion of the permit.

The structure, known for years, is about 24 miles long, trending east-west, and is a mile wide. Mezozoic beds are exposed at the surface on this uplift. The Feldman-PREPA target will be the Jurassic and Triassic beds. Core drilling will be started soon to fix fault lines and pick a location.

On the west end of the structure, north of the Provence permit, Ste. des Petroles de Valence, a British Petroleum subsidiary, has just completed an 8,000-ft. dry hole. Available evidence suggests the test was located near a major fault.

Another well being watched closely by Feldman is SIREP's 1 Greoux, about 4 miles east of the permit's eastern boundary. Below 5,650 ft. at the last report, the well has penetrated a tight massive dolomitic reef.

Swiss effort . . . Feldman's Swiss oil search is closely related to its French effort because the Swiss concessions adjoin the permits in France.

Feldman owns a 25% interest in the Swiss firm, Middleland Oil Co. Middleland in turn has farmed out its entire 217,000-acre Vaud permit to the Feldman interests because Swiss law requires 75% Swiss backing for any oil concession.

Middleland also has a permit to do seismic work on 69,700 acres to the south of the Vaud area. This, the Geneve permit, can be converted to a concession.

Feldman must spend $500,000 working on the Swiss acreage. If seis-

mic work confirms the surface work already done, the company plans a deep test of Vaud next year.

Other areas . . . Feldman's international holding company, Worldwide Petroleum Corp., is active in other areas, too.

It is starting surface work on its 110,000-acre Licata permit on the southern coast of Sicily. Named for the Sicilian coastal city, the Licata permit is about 50 miles west of Ragusa field, one of Europe's largest.

Worldwide has a minority interest in large concessions operated by Gulf Oil Corp. in Turkey. It has applied for large blocks of acreage in Algeria, both east and west of Hassi Messaoud field.

Guatemala Getting

first refinery in Central America at Puetro Barios.

CENTRAL America's first refinery will be built by a Louisiana refiner who is teaming up with affiliates of Royal Dutch-Shell.

Breaux Bridge Oil Refining Co., Inc., will build a 3,500-bbl. plant near Puerto Barios, on the Caribbean coast of Guatemala, 185 miles northeast of Guatemala City. Approval by the Guatemalan Government has cleared the way for the project.

The refinery will be completely new from the ground up. This is a change in plans from last year. The company originally asked permission to send the 1,600-bbl. crude unit and 1,200-bbl. gas-oil cracking unit from its Breaux Bridge refinery to Guatemala. This plant has been shut down. New units planned at that time were a 1,200-bbl. Unifining unit and a 650-bbl Platformer (OGJ, Oct. 21, 1957, p. 89).

Shell subsidiaries will help finance the project and supply crude for the plant. Total investment will run $3 million to $4 million.

James S. Shively, Breaux Bridge president, indicated construction will begin about January 1. Plans for the project have been drawn by Grebe & Doremus Process Co., Houston.

A separate company will be formed to operate the plant. Products will be taken by Cia. Distribuidora Guatemalteca Shell. This firm is owned 50-50 by Royal Dutch and Canadian Eagle Oil Co., which markets with Shell in Latin America.

The Puerto Barios plant will make 87 and 95-octane gasoline, kerosine, diesel oil, Bunker C fuel oil, and LPG. Plans are to produce 900 bbl. daily of gasoline the first year.

Major Oil Reserve Hit

. . . in Venezuela's Monagas State. Phillips group scores with three wildcats to brighten the area's prospects.

A MAJOR low-gravity oil reserve has been proved in eastern Venezuela with three exploratory wells by a group of six companies headed by Phillips Petroleum Co.

The wells are on a 25,000-acre tract in the Temblador area of southern Monagas. The group paid $11,257,000 for the concession in February 1957.

The group's success follows discoveries in the same area by Pan American Petroleum Corp. and Creole Petroleum Corp. for the first major oil discovery in the new eastern Venezuelan concessions. It adds considerably to the prospects of that area.

Both Creole and Pan American production lies to the west of Temblador field (OGJ, June 2, p. 87, and June 16, p. 84).

Pan Venezuelan Oil Co., a Pan American subsidiary, has completed two wells in its block. Just south of there, Creole has 16 shut-in producers at Jobo.

The gravity of crudes found in this area ranges from 8.5° to 14.6°.

Phillips' success . . . The discovery well, Monagas-Phillips-Group, 4-1 had gages up to rates of 1,200 bbl. per day flowing and pumping from three zones of the Oficina sand between 3,200-4,100 ft.

The second well 4½ miles west and the third well 5¾ miles west of the discovery both encountered comparable pay sands and are now being tested. Each exploratory well encountered in excess of 350 ft. of net pay sand.

A fourth well is being spudded 4 miles northwest of the discovery. A 30-in., 85-mile-long pipeline to the port and refining city of Caripito begins approximately 10 miles from the group's block.

The Phillips group acquired the southern Monagas tract, Lot 9, from the Venezuelan Government in February 1957. It also was awarded a 25,000-acre tract on Lot 17 in Lake Maracaibo and two 25,000-acre tracts near the Venezuela-Colombia border.

Phillips, which is the operator of the group, owns 55.75%.

The other companies in the group are: Sunray Mid-Continent Oil Co., with 17.27%, Ashland Oil & Refining Co., 10.79%, Western Natural Gas Co. and El Paso Natural Gas Products Co. together, 6.47%, Kerr-McGee Oil Industries, Inc., 5.40%, Pacific Petroleums, Ltd., and Canadian Atlantic Oil Co., Ltd., together, 4.32%.

German Crude Line

to be remote controlled. Completion due this year.

THE North West Oil Pipe Line Co. is pioneering in European automation with its Wilhelmshaven-Cologne crude line under construction in Germany.

The 230-mile. 28-in. line, designed for 200,000 bbl. daily with one station and 500,000 bbl. daily with four stations by 1956, will be operated completely by remote control. Details of operation plans were outlined by R. S. Cannon, Plantation Pipe Line Co., who was a consultant on the line owned by West German refiners.

At Wilhelmshaven there will be two control desks in the dispatcher's office—one for the tank farm and the other for the pipeline. Communication and control circuits will be leased from the government-owned telephone system.

The dispatcher in the control office will be able to gage and take temperature readings of crude in all tanks, open, shut, and indicate the position of tank-farm manifold and talk valves, and pump into and out of tanks. The takeoff valves for refinery deliveries, as well as the unattended pump stations, will be remotely operated from Wilhelmshaven.

The dispatcher can watch his telemetered gravity reading from the main-line takeoff for a refinery and push a delivery button when the proper gravity arrives. The line will be in operation by the end of the year.

Two Wells Hit in Maracaibo

TWO MORE producers have been completed in Block 1 of Lake Maracaibo.

Ted C. Stauffer, president of Venezuelan Sun Oil Co., the operator, said the wells tested at a total rate of 9,385 bbl. daily. Both were completed in the Eocene. Sun's partners in the block are Venezuelan Atlantic Refining Co. and Texaco Seaboard, Inc.

The best well, SVS 16, was dually

completed. On a ¾-in. choke it tests 3,265 bbl. daily of 35.2°-gravity crude from one zone, and 5,180 bbl. daily of 35.7°-gravity oil from another.

SVS 15 flowed 940 bbl. daily of 35.4°-gravity oil on a ½-in. choke. Perforations were between 8,447 ft. and 8,594 ft.

Argentina Signs

20-year development deal with Union Oil of California.

UNION OIL Co. of California last week signed the third oil development in a new series of moves by Argentina to put private foreign capital to work without actually granting oil concessions.

Union and Yacimientos Petroliferos Fiscales, the government oil agency, signed a 20-year contract which provides for the U. S. oil company to work in a 16,000-sq. km. area (about 9,942 sq. miles) west and north of portions of Comodoro Rivadavia which are considered proved. These semi-proved areas were assigned to Pan American International several weeks ago under a similar contract.

Under terms of the new contract, YPF agrees to pay Union Oil $12 a cubic meter (about $1.90 a bbl.) for all the oil it finds and produces.

Reports from Buenos Aires last week indicate that similar negotiations are under way between the government of President Arturo Frondizi and Jersey Standard and Royal Dutch-Shell.

German Oil Demand Gains

WEST GERMAN consumption of oil products is zooming again.

A big gain was expected the first half of this year over the first part of 1957 due to the Suez tie-up last year. But the increase has been beyond expectations. West Germans now think slack growth last year was probably temporary. It had been feared that the Suez crises followed by a business recession might have ended the post-war boom in demand.

Total demand the first half averaged 350,000 bbl. daily. This was a 30.3% gain over the first 6 months of last year. Another 29,000 bbl. daily of ships' bunker oil was sold to vessels in German ports.

A comparison of July demand against July of last year shows growth under more normal conditions. The increases are striking. Deliveries of gasoline rose 16.3%, and diesel oil was up 23%. Consumption of light fuel oil increased 42.3%, and heavy fuel oil rose 26.8%.

India's Wildcat Shows Promise

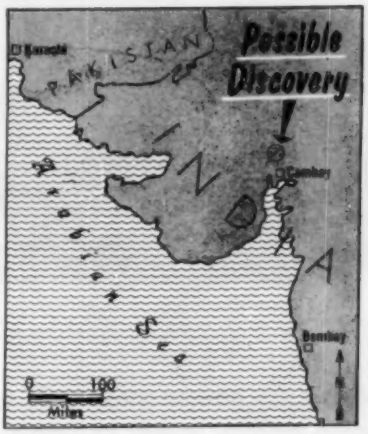
A WILDCAT drilled by a Romanian crew near the west coast of India has found oil shows in two different zones.

The well is 5 miles northwest of Cambay, on a gulf of the Arabian Sea. It is the first wildcat in that section of India.

The latest show was found at 6,440 ft. There were no immediate details, but a top-ranking member of Russia's ministry of natural resources planned a trip from Moscow to the well site to give on-the-spot advice.

The first show was encountered at 5,368 ft. The strongest flow came when mud circulation was resumed following electric logging. Oil and mud flowed in a steady stream for 15 minutes. Bottom-hole pressure was 2,800 psi.

K. D. Malaviya, minister for mines and oil, broke the news in a special speech to the Indian Parliament. The well is the most hopeful sign so far in the government-sponsored oil exploration program being carried on with Romanian and Russian help. The government search is in addition to exploration programs by a Burmah Oil Co. subsidiary and Standard-Vacuum Oil Co.



The minister said that some experts think geology of the Cambay region "compares favorably" with the Persian Gulf area. The well itself is on a small structure found by Indian specialists. Another 3 to 12 months of drilling is needed to tell whether the find is commercial.

The wildcat was spudded July 25 with a Russian-made turbodrill. A well drilled by a Romanian crew at Jwalamukhi, in Punjab, has found gas.

Another Hit Scored in Libya

LIBYA'S third oil strike in 8 months was made last week by a French company in the remote Fezzan region near the Algerian border.

The French are moving their rig to the west after testing "light" oil flow of about 8 bbl. an hour from a 75-ft. section found below 4,600 ft.

The test was made on Libya's Block 49, a tract of 2,401,812 acres granted to Cie. des Petroles Total (Libya) in May of 1956. The first test was just about 30 miles east of the Algerian border and is roughly 90 miles to the northeast of the Edjele-Zarzaitine fields on the Algerian side of the boundary.

Marcel de Panafieu, president of C. P. T. (L), said in Tripoli last week that his company believes the test was on the edge of the east-west structure. The company hopes moves to the west will put them more nearly on structure. A wildcat being drilled by Anglo-Saxon Petroleum (Shell) on its smaller Block 52 just to the south drilled through the horizon without finding a show of oil. The Anglo-Saxon test was still drilling below 6,950 ft. last week.

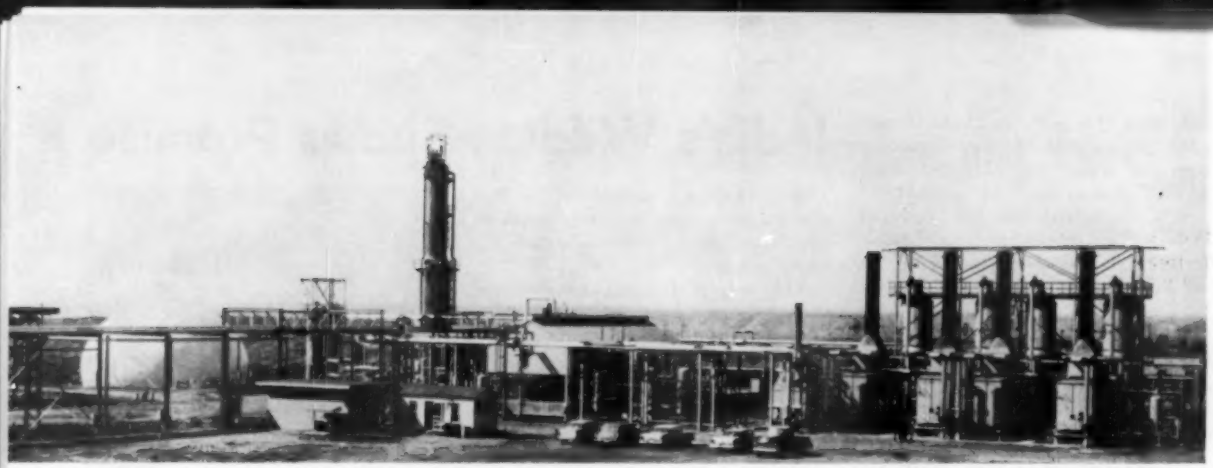
The French first encountered a trace of light oil at 4,602 ft. A number of drill-stem tests made between 4,600 and 4,675 ft. yielded from 7 to 8 bbl. an hour.

If the company can develop a commercial field on the Libyan block, it would be within 50 miles of a 24-in. pipeline planned by the French to move production from the Algerian fields north to the Tunisian port at El Shkirra (OGJ, Aug. 18, p. 122).

Chinese Field Has 30 Wells

RED CHINA says 30 wells are on production in Karamai field, discovered 3 years ago in the northwest part of the country near the Russian and Mongolian borders.

Details were not given, but the Communists say production extends 60 miles northeastward to Uerho. Reserves are estimated to be 10 times larger than in the older Yumen fields to the southeast. Fifteen more wells will be completed soon. Development also is being pushed south of Yumen in Tsinghai Province, where 63 wells are on production.



Although new-process units are usually built on a smaller scale, Phillips went all out at this Borger, Tex., plant to activate the industry's . . .

First pentane isomerization unit

BY L. E. DEAN,* H. R. HARRIS,* D. H. BELDEN,† AND VLADIMIR HAENSEL†

IN MARCH Phillips Petroleum Co. put on stream industry's first pentane isomerization unit. This unit, employing Universal Oil Products Co.'s Penex process, is designed to handle a maximum of 34,400 bbl. per day of 85% normal pentane reactor feed and produces approximately 16,000 bbl. per day of 95% isopentane.

This large installation is unusual since initial units employing a new process are generally relatively small. However, thorough study by the research departments of both UOP and Phillips showed the process to be extremely reliable, stable, and efficient, and the Phillips management did not hesitate to approve the construction of this size unit.

Although the reaction area was sized to handle a substantial portion of Phillips' normal pentane in the Borger area, initial operations are using only about 80% of the available reactor capacity. The plant startup was smooth and design conversion and yields were reached quickly. Table 1, shows actual operating data from the plant.

Why upgrade? . . . Much work has been done throughout the natural-gasoline and petroleum industry on the upgrading of light hydrocarbons. The realization that normal pentane was one of the major remaining components of natural gasoline which could be readily upgraded prompted Phillips to look into the various processes available for converting normal pentane into isopentane. After considerable study, Universal Oil Products Co.'s Penex process was selected.

The decision to isomerize normal pentane can be better understood if it is realized that the conversion of the contained normal pentane to isopentane will increase the over-all research octane number of the average natural-gasoline about five octane numbers (with 3 ml of TEL). This improvement in quality serves to make natural gasoline more valuable for blending in today's high-octane motor fuels.

TABLE I—PLANT OPERATING DATA

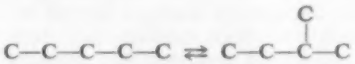
	Barrels per steam day		
	Reactor feed	Reactor product	Net production
Isopentane	3,670	15,712	12,042
Normal pentane	22,393	10,360	−12,033
Cyclopentane and heavier	591	427	− 164
	26,654	26,499	

Isopentane produced,	
Vol. % of normal pentane disappearance	100.1
Mol. % of normal pentane disappearance	99.1
Isopentane, Vol. % of C_5 paraffins in reactor product	60.3
Isopentane product	
Vol. % isopentane	96.0
Barrels per stream day	12,544
Research octane number, clear	*95.6
Research octane number, +3 ml. TEL	*104.1

*Blending octane numbers in alkylate

Also isopentane, in common with other isoparaffins, has low sensitivity (research octane number minus motor octane number) which means improved road-octane performance. The increase in octane level will also permit blending larger quantities of pentanes in premium gasoline.

Pentane specific . . . The Penex process, while capable of isomerizing both normal pentane and normal hexane, has been used at Borger for the specific purpose of isomerizing normal pentane to isopentane. This isomerization reaction is limited by equilibrium considerations according to the following equation:



As is the case with most paraffin isomerization operations where highly branched-chain molecules are the desired product, a more favorable equilibrium is obtained at low temperatures. Fig. 1 is the experimentally determined equilibrium curve for the normal pentane - isopentane system which includes the operating conditions used in the Penex process.

Research work by UOP indicated that the more highly branched neopentane is absent in the product from the reaction system, although thermodynamic calculations indicate that it should be present in a concentration of 5 to 10% for the temperature range of current interest.

*Phillips Petroleum Co., Bartlesville, Okla.
†Universal Oil Products Co., Des Plaines, Ill.

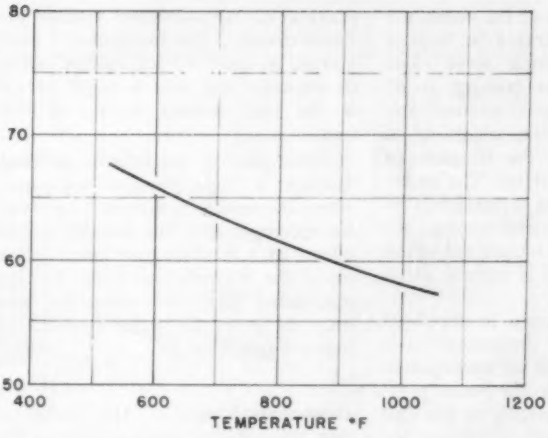
Its absence is consistent with the established carbonium ion mechanism for the isomerization reaction. This lack of neopentane is borne out by analyses of the reactor effluent from the Borger commercial unit. This is important since the leaded octane number of neopentane is about seven units lower than that of isopentane.

The Penex process accomplishes the isomerization of normal pentane under conditions of (1) relatively low temperature, (2) close approach to equilibrium in the reactor effluent, and (3) high efficiency. The UOP-type I-3 catalyst employed also overcomes many of the problems associated with more highly acidic isomerization systems by permitting operation under noncarbonizing and nonsludging conditions. This is achieved by hydrogenation of coke and sludge precursors through use of a hydrogen atmosphere and a hydrogenation component in the catalyst.

Reaction conditions . . . The relatively low operating temperatures give a more favorable iso to normal pentane equilibrium in the product. The close approach to this equilibrium means a higher-quality product for a once-through operation, or less fractionating capacity for a recycle operation. These factors, together with the high efficiency of the isomerization reaction, are achieved through careful formulation and manufacture of the catalyst.

The processing of a pentane fraction in a Penex unit has presented no particular problems not readily handled in the plant design. Olefins are not normally present but, if they should exist in the feed, they are completely saturated in the Penex reactor at the expense only of the hydrogen required for saturation.

The I-3 catalyst is susceptible to many of the same metallic poisons which adversely affect other noble-metal catalysts. Fortunately, however, the contaminants have not been identified in sufficient quantities in virgin pentane fractions to cause any concern.



EXPERIMENTALLY determined equilibrium curve for the normal pentane-isopentane system which includes the operating conditions used in the Penex process. Fig. 1.

One of the unique features of the I-3 catalyst is its ability to cope with limited amounts of contaminants such as sulfur or water, which may frequently be found in reactor feed and makeup hydrogen streams. Such contaminants exhibit only a temporary inhibiting effect on the catalyst, which effect readily disappears once the contaminant is removed from the entering stream.

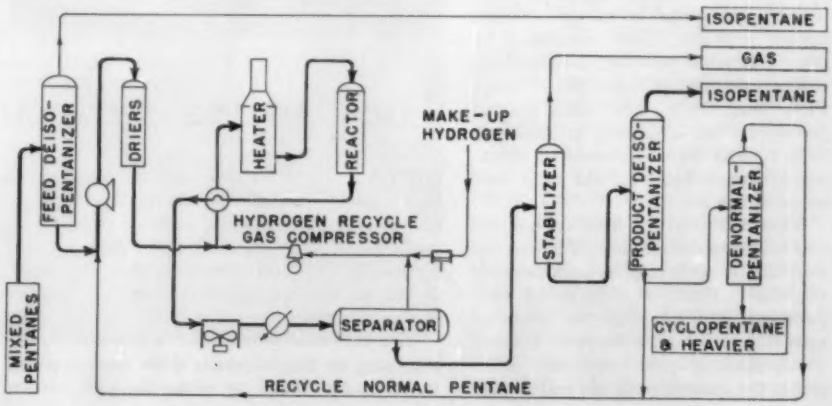
Further, their continued presence can be overcome by moderate changes in operating conditions without any significant sacrifice in product yields or efficiencies. The remarkable characteristics of the I-3 catalyst are shown by pilot-plant runs of up to 100-bbl. per pound duration with very low carbon levels on the spent catalyst of 0.10% or less.

Design work . . . Late in 1956 engineers of UOP and Phillips started the final design of the Borger Penex unit. Process design of the reaction area, including the product stabilizer, was handled by UOP. Process design of the fractionating and storage facilities as well as the mechanical design and construction of the entire unit was handled by Phillips. The flow sheet is shown as Fig. 2.

The normal pentane feed for the Phillips unit is separated entirely from natural gasoline. A mixture of pentanes is fractionated to give a normal pentane feed of approximately 85% purity. The maximum tower size used in this feed fractionation is 13 ft. in diameter and has 100 trays. Air-fin coolers are used for the entire vapor-condensing service and the towers are reboiled with 50-psig. stream in internal heating elements.

The reaction area of the plant was designed to take full advantage of the unique features of I-3 Penex catalyst, not only when charging the fresh feed but also when charging the normal pentane that is recycled from the reactor effluent. In comparison to catalytic reformers, the isomerization reaction is carried out at much higher space velocities (volume of reactor feed each hour per volume of catalyst in the reactor) and at significantly lower temperatures and hydrogen circulation rates.

Since pressure in excess of 200 psig. has very little effect on the fundamental reaction pattern, the level used was largely dictated by mechanical design considerations.



FLOW SHEET of Phillips' Penex unit, which was designed by UOP and Phillips engineers. Fig. 2.

Feed streams . . . All of the combined liquid feed is dehydrated in bauxite drying chambers which gives close control of the water content at all times. This will also remove any quantities of free water which might come from leaks in the fractionator stream reboiling elements. The makeup hydrogen required is furnished by a Platformer unit located nearby. All makeup hydrogen is treated for sulfur removal and is dried in bauxite dehydrators.

The recycle hydrogen is circulated with a centrifugal compressor and even though the ratio of hydrogen to hydrocarbon is low in the Penex process, the high feed capacity of this unit requires approximately 2,000 hp. for hydrogen circulation. The steam turbine driving the compressor uses superheated 250-psig. steam and exhausts at 50 psig. The exhaust steam is then used to reboil the deisopentanizing towers.

Since it is desirable to know when an excessive amount of water has entered the reaction system, a continuous water analyzer has been provided on the hydrogen recycle stream. The sampling system for this intsrument is such that it is also possible to check the moisture level of the makeup hydrogen.

Four reactors . . . The economics of design dictated the use of four parallel reactors. The advantage of operating at optimum efficiency, requiring close control of reactor temperatures, led to the provision of individual charge heaters for each reactor. It should be noted that the very low exothermic heats of isomerization and hydrocracking result in a small rise in temperature through the reactor. This makes possible a single charge heater and reactor on each of the parallel streams without the necessity for interheating or intercooling.

The splitting of the feed stream and the hydrogen recycle, and their subsequent combination to give the correct hydrogen/hydrocarbon ratio in each reactor, presented a rather difficult control problem. This was solved by using electronic temperature and flow controls on the hydrogen recycle loop. Flow controllers, with ratio control provisions, are employed to automatically provide equal volumes of identical hydrogen/hydrocarbon ratio feed to each reactor.

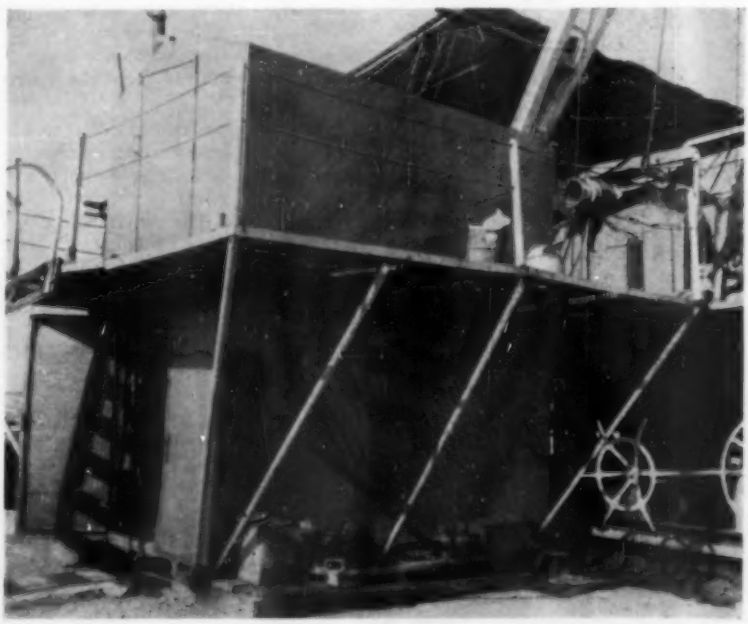
Two methods are used to indicate and measure the amount of isomerization that is occurring in each reaction chamber. First, a differential temperature recorder gives the temperature rise across each reactor. Second, a chromatographic analyzer determines the quantities of iso and normal pentane in the individual reactor effluent streams. The instrument is programed to analyze each reactor outlet in sequence and was a major factor in the fast, smooth startup of this unit.

After passing the reactor effluent through a high pressure separator, where the recycle hydrogen is removed for recompression, the product is stabilized in a fractionating tower to remove the butanes and lower boiling materials. This tower uses four-pass trays in order to accommodate the heavy liquid load.

Deisopentanizing . . . After stabilization, the stabilizer kettle product is fed to two 13-ft.-diameter by 100-tray deisopentanizing towers operating in parallel. These towers produce 95% isopentane overhead and approximately 85% normal pentane as kettle product. A small tower is included in the product fractionation system to separate the small amount of materials heavier than normal pentane from the recycle stream and prevent an excessive concentration of these materials from building up in the unit. A flow scheme of the entire unit is shown in Fig. 2.

A scale model of the reaction area, complete with all piping and fittings, was constructed for use in the mechanical design of the plant. After design and drafting were completed, this model was sent to the plant site for reference during construction and was finally turned over to plant personnel for operator and maintenance personnel training.

The operating performance of the Penex unit for isomerization of normal pentane installed at Borger has justified the faith placed in the process by the Phillips management in authorizing the erection of this important new refining tool. To date it has given every indication of being a very economical and efficient process.

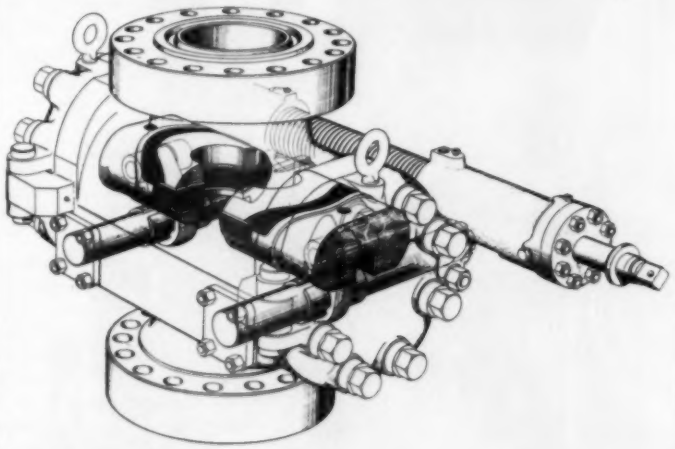


Tool house supports doghouse

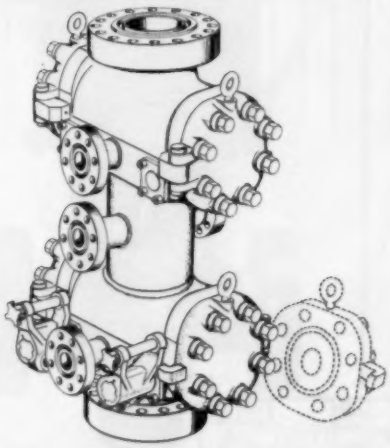
A NEAT HOOKUP for spotting the tool house so that it supports the doghouse and the catwalk around the doghouse is used by Hall & Stewart, Hobbs, N. M., on their Rig No. 7 shown working on Humble's Daughtry in Lea County.

The catwalks around the doghouse are hung on hinges which allow them to be neatly folded up along the side of the building when being moved. After the derrick floor has been spotted on a new location, the tool house is set level with the derrick floor and the doghouse skidded off on top.

The catwalks are then unhooked from the sides of the doghouse, swung down, and made to rest on braces fastened to the tool house bottom.



NEW LIGHTWEIGHT, high-pressure blowout preventer. Rams are moved by rotating the two horizontal shafts. Fig. 1.



DOUBLE UNIT showing optional spacer, with side outlet. The spacer is long enough to accommodate a tool joint. Fig. 3.

Rig air operates this

New blowout-preventer system

It's rated at 15,000 psi. working pressure, but is lightweight

By ED McGHEE
Drilling Editor

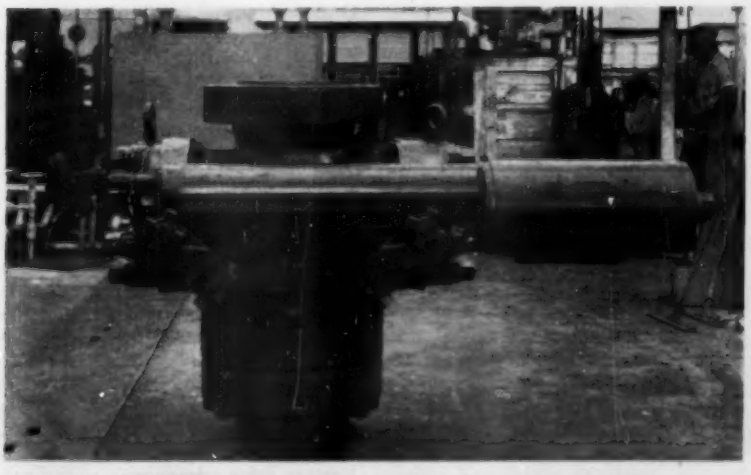
A NEWLY INTRODUCED well-control system has these advantages:

1. All preventers can be closed by rig air pressure alone regardless of the pressure in the well.
2. All preventers can be closed quickly by hand against any well pressure.
3. Ram-type preventers can close and seal on the kelly and the drill collars.
4. Any gate valve in the system can be remotely opened or closed by rig air pressure.
5. The preventers are lighter and smaller than older styles; working pressure goes to 15,000 psi. in some sizes.

Because of these features:

- All blowout-prevention operations are faster, safer, surer.
- No expensive high-pressure hydraulic system need be installed.
- Maintenance cost of the blowout-prevention system is low.

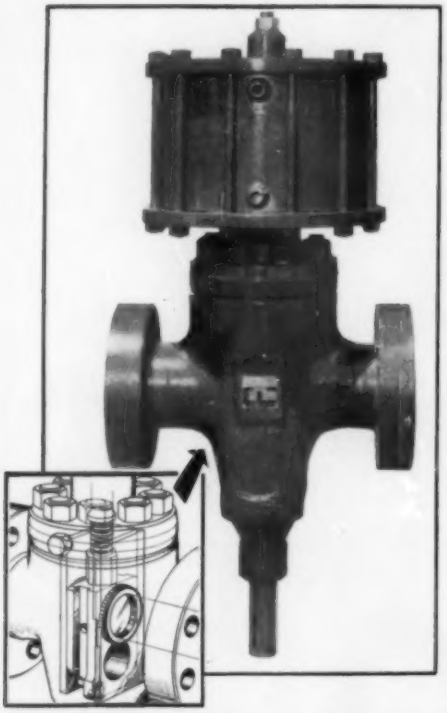
The heart of this blowout-prevention system is Cameron Iron Works' new Type F preventer, Fig. 1. A new rotating-seat gate valve and air operators for both pieces of equipment are the other major components.



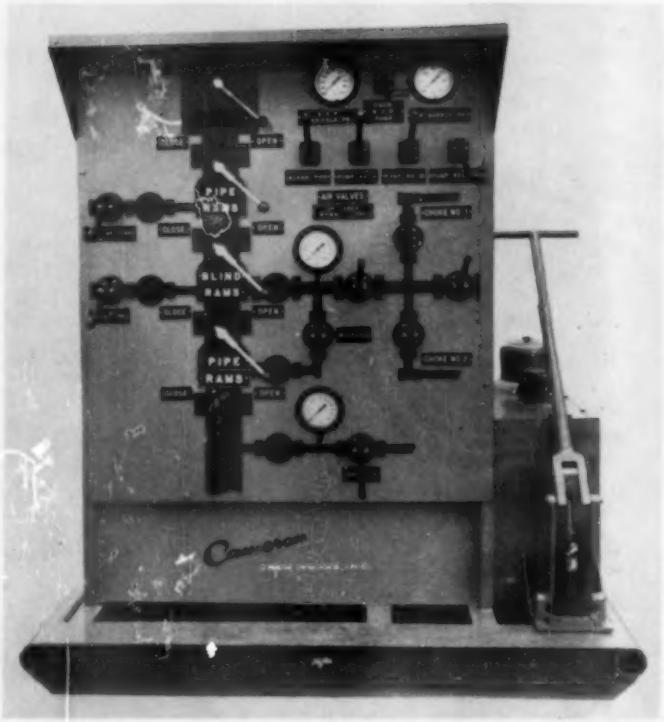
NEW TYPE PREVENTER showing operator side. The operator uses low-pressure air. Fig. 2.

Balanced-shaft preventer . . . This preventer is built for extremely high pressures—the first ever to be rated for 15,000-psi. working pressure—yet it weighs less than the standard models. It is smaller in over-all length than other styles, and is easier to handle. The preventer is available in all usual sizes and pressure ratings as well as in the extremely high-pressure models.

The rams are not operated by rods extending out of the back of the preventer case as other styles are. Instead, the rams have a nearly vertical T-slot which extends through them in the rear. In this T-slot, there is an arm and roller assembly carried by a horizontal shaft. Turning this shaft moves the rollers in the T-slot and this moves the ram. The ram-operating shaft extends through a packing



AIR-OPERATED gate valve. Inset shows details of the rotating seat. Low-pressure air will operate the valve. Fig. 4.



GRAPHIC PANEL with controls for operating all valves and preventers in the control system. Panel symbols may be altered to fit any piping arrangement desired. Fig. 5.

on both sides of one preventer case. Thus, the shaft is "balanced" under pressure. To turn the shaft requires no more force than is necessary to overcome the friction in the packing, the rollers, and rams.

Use low-pressure operator . . . An operator, Fig. 2, has been designed which uses only rig air pressure but which can close the preventers regardless of the pressure on the well. One operator can be substituted for another of the same size. Thus, in an emergency, an operator could be moved from one preventer to another on the same hookup.

Of course, the preventer can be opened or closed by a hydraulic operator working off conventional style hydraulic accumulators.

There is only one locking screw on both the air operator and the hydraulic operator. This means that both rams can be closed with only one handwheel, regardless of the well pressure.

Double, triple units, too . . . Other innovations with this new preventer are the double and triple models. The double models have two sets of rams in a single case. This arrangement (1) eliminates flanged connections which are always a possible source of leaks; and (2) saves the space required by flanged connections between individual preventers.

The double model, like the triple model, is available with a spacer between the preventer units, Fig. 3. This spacer positions the rams of the two preventers far enough apart that there is room for a tool joint between.

All preventers—single, double, and triple—can be fitted with side outlets below the rams.

Kelly, drill-collar rams . . . Many rigs, particularly on the Gulf Coast, presently use a "universal" type of preventer on top of their ram-type preventers. With the same sealing element, this universal preventer can close off against all members of the drill string as well as against the open hole.

Special rams have been designed for the new equipment which will do two of the main jobs heretofore done only by universal preventers. This is, the company is making kelly rams and drill-collar rams.

Thus, with only ram-type preventers, drillers can get blowout-tight seals against open hole, drill pipe, drill collars, and the kelly. Besides the advantage in operating pressure, packing elements for ram-type preventers are cheaper and last longer than those for universal preventers.

Using small-diameter hose . . . Not only do these preventers close with very little pressure, they need very little air volume. For that reason there's no need for the high-pressure steel pipe used to supply oil to operate older-type preventers. The new ones can use flexible hose. This hose is long lasting and low in cost. Moreover, it can be installed in a fraction of the time required for steel pipe and it is not affected by vibrations as steel is.

Boost for opening . . . Like some older preventers, the new preventer is "pressure-energized" in a sense. That is, the higher the pressure on the well, the tighter the seal.

Because of this same pressure-energizing it takes more force to open the rams under pressure than to close them. For that reason, small booster pumps are included in the control system.

When pressure is equalized across the rams, air pressure alone will open them. If there is a big pressure differential across the rams, an air-operated booster pump can force fluid into the preventers with efficient pressure to open the rams. Should this air pump fail, there is an inexpensive hand pump which also can do the job.

Remote valve operation . . . The second major element in the new blow-

out-prevention system is the air-operated gate valve. Shown in Fig. 4, these valves can be remotely controlled from the same panel as the blowout preventers. A quick-opening valve can be put on the casing annulus in case a dangerous pressure is built up there. A valve can be quickly closed in the standpipe in case of backflow through the drill pipe. And, the driller can remotely open a valve in the mud line to vent pressure into the pits and prevent "popping" a shear relief valve.

The air operator that has been designed for use with this gate valve is simple and has few working parts. A hydraulic valve operator has also been designed for systems using high-pressure fluids.

Like the air-operated preventers, the air-operated valves need only low pressure and low volume. The valves too can use inexpensive hose instead of steel pipe.

Seat rotates . . . To counteract the effect of abrasive conditions, this new valve has been made with a rotating seat. See inset Fig. 4. Reason is that the company found in its test work that the downstream seat is always the first element of a valve to cut out. If this downstream seat can be preserved, the valve lasts longer.

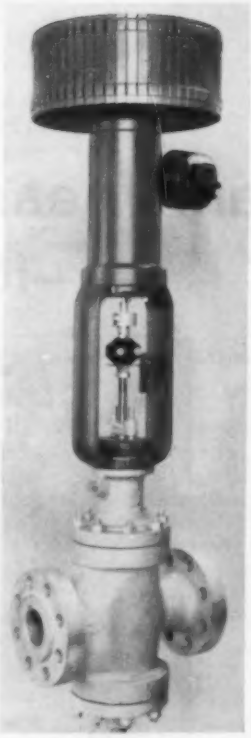
A ratchet arrangement has been built into the valve so that each time the valve is operated, the seat rotates a fraction of one revolution. This, the company says, evens out the wear over the entire seat and gives the valve a life many times greater than that of other valves in similar service.

Into a graphic panel . . . This operating system makes it possible to automate all the valves in the mud system and the drilling-control hookup. To make it simple for men on the rig to operate the system in an emergency, the control system has been put into a graphic panel, shown in Fig. 5.

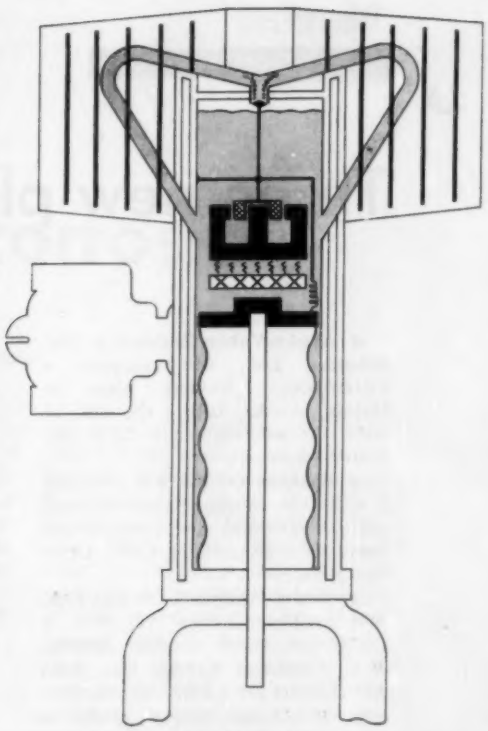
The forms on the graphic panel can easily be switched around to represent the hookup in use.

The driller can tell by the sound of the air valves on the panel if the operation of the gate valves and preventers is correct. That is, if he moves the air valve to close a particular preventer and there is no air sound in the valve, the driller will know that preventer is already closed. The same is true for the controls on the gate valves. Besides, the gate valves have indicator stems which show whether they are open or closed, and a look at a preventer will show its position.

The graphic panel can also be fitted with pressure gages to show pressures in the air system, on the wellhead, in the annulus, or in the choke manifold.



NEW VALVE unit, with cooling condenser on top.



HEAT-TRANSFER SYSTEM in new valve actuator provides means for valve positioning.

Constant rate of heat release is basis for

New control-valve actuator

THIS NEW DEVICE operates on the basis of a constant heat input with a varying rate of heat release, depending on the signal from the process controller.

Heat input is provided by an electric heater. This heat causes constant vaporization of a fluorinated hydrocarbon compound, thus tending to increase pressure within the system. The operating coil, coupled with a mechanical position-feed-back loop, controls a heat-release valve. This valve regulates the release of vapor through a cooling condenser, back into the system (see cross-section sketch).

When the rate of heat release is reduced, pressure builds up within the actuator, causing a bellows to contract, thus actuating the valve in a downstroke. When rate of heat release is increased, the bellows expands, causing an upstroke.

The operating coil and simple valve arrangements are designed so that they continuously effect a balance between heat input and heat output. Dead-beat positioning is achieved at any point within the limits of the actuator. Heat input is constant and the condenser capacity is more than needed. Thus, maximum power in either direction is instantly achieved.

The design of the bellows and the combination of operating coil working with mechanical position-feedback loop, gives an accurate signal response and involves negligible hysteresis.

The device requires no air connections or electrical contacts of any kind. The system is not affected by ambient temperatures, line temperatures, radiant heat, or weather. All moving parts are hermetically sealed and completely submerged in noncorrosive, dielectric fluid.

The unit is of explosionproof construction, operating on 115 volts a.c. or d.c. Stroke is 1.5 in., and on power failure, stem retracts. Stem-loading actuating force is 500 lb., opposed by a spring force of 300 lb.

Known as Thermo-Drive actuator, the unit is built by the Swartwout Co. for use in electronic-control systems.

Refinery

CONSTRUCTION REPORT

Three new plants near completion —four more planned

SHADED PORTION of map is area covered in this survey.

● **Alaska-Yukon Refiners & Distributors, Ltd.,** will complete a $6,000,000, 7,500-bbl. plant at Haines, Alaska, before the end of 1958. It will include a 2,500-bbl. thermal cracker.

● **Bankline Oil Co.** will complete a 4,000-bbl. Sinclair-Baker reformer and a 4,000-bbl. hydrodesulfurization unit at Bakersfield, Calif., October 1958.

● **British American Oil Co., Ltd.,** will complete October 15, 1958, a 20,000-bbl. plant at Port Moody, B. C. **Canadian Kellogg Co., Ltd.,** has contract for a 9,000-bbl. vacuum unit to charge topped crude, a 13,500-bbl. fluid cat cracker (33% recycle), a 4,000-bbl. Atlantic Catformer, a 1,000-bbl. sulfuric acid alkylation unit, and a 7,200-bbl. hydrogen treating unit.

● **Cal-Mex Oil & Refining Co.** has let a $27,000,000 contract to **Ralph M. Parsons Co.** for a 20,000-bbl. plant near San Diego, Calif. The plant, to be completed early 1959, will include a cat cracker, cat desulfurizer, cat reformer, and a sulfur-recovery unit.

● **Douglas Oil Co. of California** will increase crude capacity to 5,000 bbl. at Paramount, Calif., in 1959.

● **General Petroleum Corp.** will increase visbreaking capacity 2,500 bbl. at Torrance, Calif., by late 1958.

● **Hancock Oil Co.** has contracted with **C. F. Braun & Co.** and **Ralph M. Parsons Co.** to analyze the damage and make recommendations for replacements at its fire-gutted plant at Signal Hill, Calif.

● **Pacific Supply Cooperative** has bought site for a proposed plant at Vancouver, Wash.

● **Richfield Oil Corp.** plans a $50,000,000 plant at Everett, Wash., with probable completion set for 1965.

● **Rothschild Oil Co.** is adding an 8,000-bbl. cat cracker at Santa Fe Springs, Calif., at a cost of $2,000,000. **C. F. Braun & Co.** is contractor. Platforming capacity will be increased 1,500 bbl.

● **Shell Oil Co. of Canada, Ltd.,** will complete February 1959, a distillate hydrodesulfurizer at North Burnaby, B. C. **Fluor Corp. of Canada, Ltd.,** has contract for the project which will cost over $2,000,000.

● **Standard Oil Co. of California** will build a $75,000,000, 60,000-bbl. plant at Mukilteo, a suburb of Everett, Wash.

At Richmond, Calif., a 55,000-bbl. Esso Model IV fluid cat cracker will be completed summer 1959, by **Fluor Corp., Ltd.**

● **The Texas Co.** will complete a 40,000-bbl. plant at Anacortes, Wash., by January 1, 1959. It will include a 16,000-bbl. vacuum unit to charge topped crude, a 25,000-bbl. fluid cat cracker, a 7,000-bbl. Platformer, an 11,000-bbl. Hydrotreater, a 2,000-bbl. sulfuric acid alkylation unit, and a 1,000-bbl. catalytic polymerization unit. General construction is by **Bechtel Corp.** Furnishing and erection of tankage is by **Chicago Bridge & Iron Co.**

At Wilmington, Calif., **Ralph M. Parsons Co.** will complete a 7,500-bbl. Udex unit February 1959.

Next month . . .

Your next monthly refinery construction report will cover projects in the Gulf Coast area. It will appear in The Oil and Gas Journal's October 27 issue. You will find current activity reported each week in the Journal's news section. Be sure and check Processing Briefs weekly for new developments.

How to combat

High-sulfur-fuel corrosion

BY W. L. NELSON
Technical Editor and Petroleum Consultant

What information do you have available on corrosion problems in burning high-sulfur fuels in power plants and refinery furnaces? Can you tell us where the best summary on such information may be obtained? A.T.

We are unable to direct you to discussions specifically directed to the control of corrosion due to high-sulfur fuels. However, the effect of sulfur (sulfur dioxide mainly) in furnace atmospheres is qualitatively understood. Thus, the minimum cold-end temperatures that must be maintained in power plant are preheaters in order to prevent severe corrosion is somewhat as shown in Table 1 (Southern Power & Industry, February 1933, p. 96). Vanadium and other metals are a factor as well as sulfur. The thermal efficiency of the operations is, of course, harmed by high outlet-gas temperatures.

Difficulties with high sulfur or sulfidizing atmospheres can be alleviated by the use of high-chromium steels (see Table 2), and the superior resistance of the straight chromium (or very low nickel stainless steels) is attested by the use of 28% chromium 2% nickel steel for the rabble arms and blades of roasters

TABLE 1—MINIMUM COLD-END TEMPERATURES FOR AIR PREHEATERS, °F.

Fuel—	1% S	2% S	4% S	6% S
Pulverized anthracite	150	154	...	...
Natural gas—sweet*	160	164	...	...
Pulverized eastern bituminous	165	168	199	230
Pulverized Midwest bituminous	180	180	203	233
Fuel oil, domestic	185	185	215	245
Underfeed stoker, eastern bituminous	185	189	219	249
Underfeed stoker, Midwest bituminous	200	200	203	253
Natural gas—sour	205	205	232	263
Fuel oil, high vanadium	215	215	238	268

*Under 15 grains, SO_2 per 100 cu. ft.

TABLE 2—MATERIALS FOR HIGH-TEMPERATURE TUBE SUPPORTS

Name—	Type of material	Approximate composition, per cent— Carbon	Silicon	Chromium	Nickel	Others	Scaling temp., °F.— Oxidizing*	Reducing	Sulfidizing	Design strength, psi.†	Notes
Gray iron	Cast iron	3.2	1.5-2.0	.....	...	...	600	....	....	....	Insulated end supports
Meehanite	Alloy iron	3.0	1.0-1.4	0.5-1.0	...	...	900	....	....	....	Insulated end supports
Nickel chromium iron	Alloy iron	3.2	1.2-2.7	0.5-0.75	1.4	...	1,000	....	....	200	Convection tube sheets
Scale-resisting iron	Alloy iron	2.6-3.0	1.25-2.2	.....	12-15	...	1,300	....	....	300	Convection tube sheets
Ni-resist iron	Alloy iron	3.0	1.6	3.3	14.3	5.3 Cu	1,400	....	....	300	Convection tube sheets
Type 410 steel‡	Steel	0.10	0.35	11.5-14	...	...	1,400	1,100	....	§250	Hottest convection supports
17 chromium	Steel	...	0.6	17	...	...	1,500	1,300	1,300	§350	Hottest convection supports
HC casting‡	Steel casting	0.4	0.9	26-30	4	0.5 Mo	2,100	1,700	1,700	§90	Hottest convection supports
HF 18-8‡	Steel casting	0.35	1.8	18-23	8-12	0.5 Mo	1,600	1,300	1,600	3,000	Radiant supports
HH 24-12‡	Steel casting	0.35	1.8	24-28	11-14	0.5 Mo	2,000	1,900	2,000	§620	Radiant supports
HE 28-10‡	Steel casting	0.35	1.8	26-30	8-11	0.5 Mo	2,100	1,900	2,000	§470	Radiant supports
HK 25-20‡	Steel casting	0.4	1.8	24-28	18-22	0.5 Mo	2,100	2,000	2,100	§560	Radiant supports
HX 65-15‡	Steel casting	0.55	2.3	15-19	64-68	0.5 Mo	1,800	2,100	....	2,000	Radiant supports
HT 35-15‡	Steel casting	0.55	2.3	13-17	33-37	0.5 Mo	1,900	2,000	....	§1,200	Radiant supports

*With moderate amount of sulfur dioxide. †Based on creep strength at oxidizing scaling temperature. ‡"Types" of the American Iron and Steel Institute; and the HC, HH, etc., designations are those of the Alloy Casting Institute. §Estimated.

TABLE 3—EFFECT OF SULFUR ON STACK TEMPERATURE OF POWER-PLANT BOILERS

Per cent sulfur	Type of fuel	Grains SO_2 per 100 cu. ft.		Minimum metal temperature* in tubular air heaters or economizers		
					Coal†	
		Coal	Oil	Oil†	Chain grate	Pulverized
1.0	Lowest of fuel oils	62	49	‡180	‡180	‡160
1.22	East Coast oil	76	60	‡180	‡180	‡160
2.0		124	98	‡180	205	‡160
2.4	Average East Coast bunkering fuel	148	118	200	220	‡160
3.0		186	147	222	239	‡176
4.0	Middle West coal or Middle East fuel oil	248	196	244	259	‡193
5.0		310	235	258	276	‡206
6.0	Highest-sulfur fuel oils	371	287	270	290	217
8.0	Lowest-grade western coal	496	...	...	...	...

*Really feed-water inlet temperature to economizer. †W. H. Rowland, Bull. 3-407 of Babcock & Wilcox Co. ‡Minimum of 212° F. on all economizers.

for zinc sulfide ores that produce an atmosphere containing even 35% of sulfur dioxide (Fahrenwald, F. M., Metallurgy for High-Temperature High-Sulfur Process Conditions, Pet. Engineer, August 1950, p. C-11). However, the straight chromium steels are inferior because of tendencies toward migration of carbides to the grain boundaries at high temperatures, and hence the chromium-nickel steels (Table 2) are also widely used for tube supports.

Unfortunately, little information is available on just how much sulfur dioxide is troublesome. However, H. R. Clauser (Heat-Resisting Castings, Materials and Methods, October 1950, p. 79) suggests that gases containing over 100 grains per 100 cu. ft. of sulfur dioxide are troublesome and require the use of high-chromium nickel steels for oxidizing (and sulfurizing) atmospheres whereas the straight chromium steels (or lower nickel contents) are suggested if the furnace atmosphere is also reducing. This can be somewhat a problem with petroleum fuels on the West Coast and with East Coast bunkering fuels (foreign) because such oils contain over 2% sulfur and produce flue gases which contain over 100 grains of sulfur dioxide (see Table 3). These same relationships have been interrelated in Table 3 which is Table 14-7 of the fourth edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., Inc., New York, 1948).

References on pipeline costs

I should be very obliged if you could give me some of the following cost information for oil pipelines:

1. Basic cost divided into material and labor costs.

2. Pump stations and buildings.

3. Transporting and laying the pipe.

4. Right-of-ways, cost of filling, etc.

5. Operating costs divided into power, wages, taxes, depreciation, etc.

And with respect to other means of transportation, such as ocean-going tankers, barges, railroad tank cars, trucks, etc.:

6. Basic costs of equipment divided into material and labor costs.

7. Operating costs in detail.

Perhaps you can suggest references. B.H.

Of course, these many items must be assembled by the man that is making the estimate. Accordingly, only directions to references can be given here.

The following answers to Questions on Technology have appeared in The Oil and Gas Journal. They pertain to the general over-all costs of transportation, and accordingly do not usually itemize the elements which compose the total cost.

1. Sept. 7, 1953, p. 133—Cost of Tanker Transportation, USMC Costs.

2. Sept. 21, 1953, p. 351 — Pipeline Transportation Costs.

3. Dec. 14, 1953, p. 157—Ocean Distances and Freight Rates.

4. Jan. 18, 1954, p. 117—What Price Oil Trucking?

5. Mar. 29, 1954, p. 132—How Transportation Costs Compare.

6. Apr. 2, 1956, p. 140—References to Ocean Transportation.

7. Aug. 20, 1956, p. 241—Scale and USMC Tanker Rates.

8. Oct. 21, 1957, p. 134—What's the Average Cost of Tanker Transportation?

Information is not at all complete, but in fact if such complete and detailed information were available, there would be little need for engineers and economists.

Somewhat more detailed information about pipeline construction costs is given in the following articles:

9. Nelson, W. L., Pipeline Construction Costs (Cost-imating No. 22), The Oil and Gas Journal, Dec. 3, 1956, p. 134.

10. Elam, J. B., Pipeline Cost Estimating, The Oil and Gas Journal, Oct. 10, 1955, p. 139.

11. McLean & Haigh, The Growth of Integrated Oil Companies, Harvard School of Business, 1954.

12. Emerson, H. N., Oil No. 1 Transportation Job, The Oil and Gas Journal, Nov. 18, 1957, p. 226.

13. Lynch, R. H. An Economic Study of a Products Pipeline, Pet. Engineer, Nov. 1950, p. D-24.

14. Kennedy and Stueve, Sizing Crude Oil Pipelines, The Oil and Gas Journal, Sept. 21, 1953, p. 183.

15. Glass, D. C., Coating Practices and Protection Costs, The Oil and Gas Journal, June 20, 1955, p. 133.

16. Chilton, C. H., Chemical Engineering, June 1949, p. 97.

17. Unruh, E. W., Pet. Engineer, Reference Annual, 1951, p. D-3.

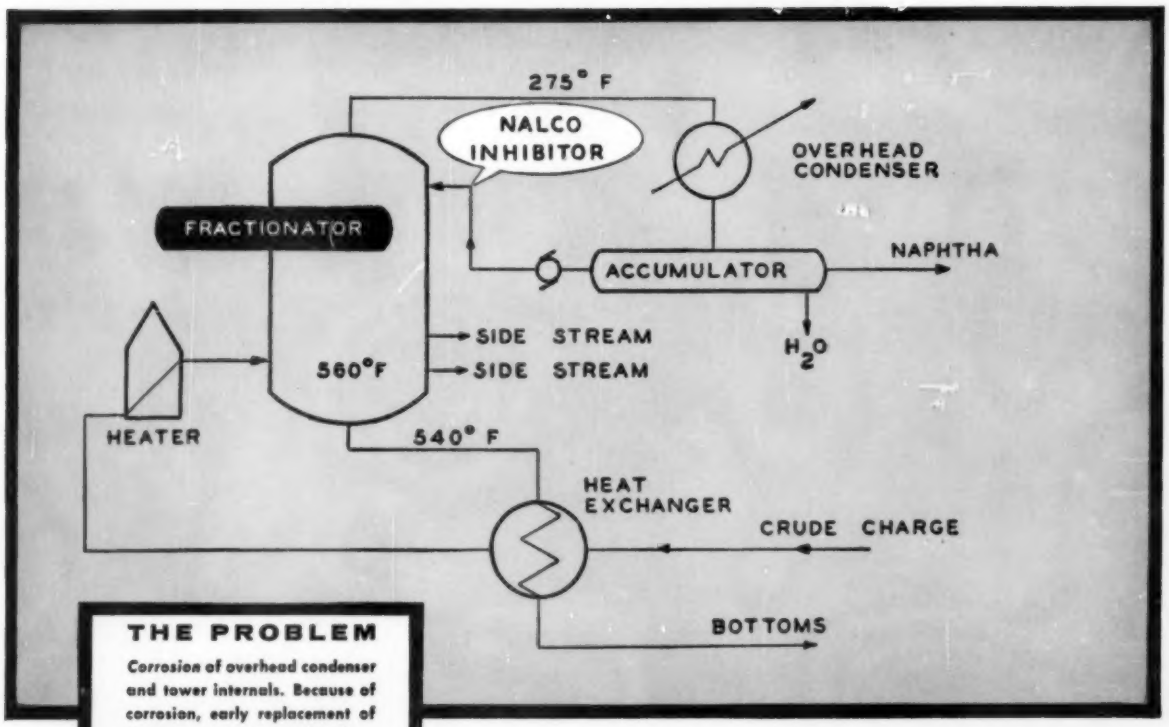
18. Anon., What's Ahead for Product Pipelines, Nat. Pet. News, Oct. 22, 1953, p. 26.

19. Barnes, K. B., Pipelines—Greatest Transport Bargain, The Oil and Gas Journal, Sept. 17, 1956, p. 142.

Among these, References 9-15 are probably the most useful. The cost estimator is always confronted with costs or prices at different dates. Just how are these to be compared or brought to a current basis? Reference 9 (Nelson) suggests a pipeline construction cost index that can be brought up to date from readily available information. In addition, Reference 9 probably gives more complete information on certain miscellaneous pipeline construction costs than any other single reference — such items as surveying, cleaning right-of-way, hauling, ditching, etc.

Elam (Reference 10) probably provides the most detailed information on pipeline operating costs, and Reference 13 (Lynch) provides the same type of operating information. McLean and Haigh (Reference 11) outline the general economic relationships involved in pipeline operations, and somewhat the same information but illustrating by means of specific situations, is provided by References 13 and 14 (Kennedy and Stueve). Finally, Reference 12 (Emerson) compares all means of transportation and provides costs of tankers, barges, pipelines, etc., as well as indications of manpower and horsepower requirements.

HOW *Nalco* INHIBITORS CUT DOWNTIME 74% ... AND SAVED THIS FRACTIONATING TOWER



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Corrosion of overhead condenser and tower internals. Because of corrosion, early replacement of the tower was contemplated.

THE TREATMENT

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THE RESULT

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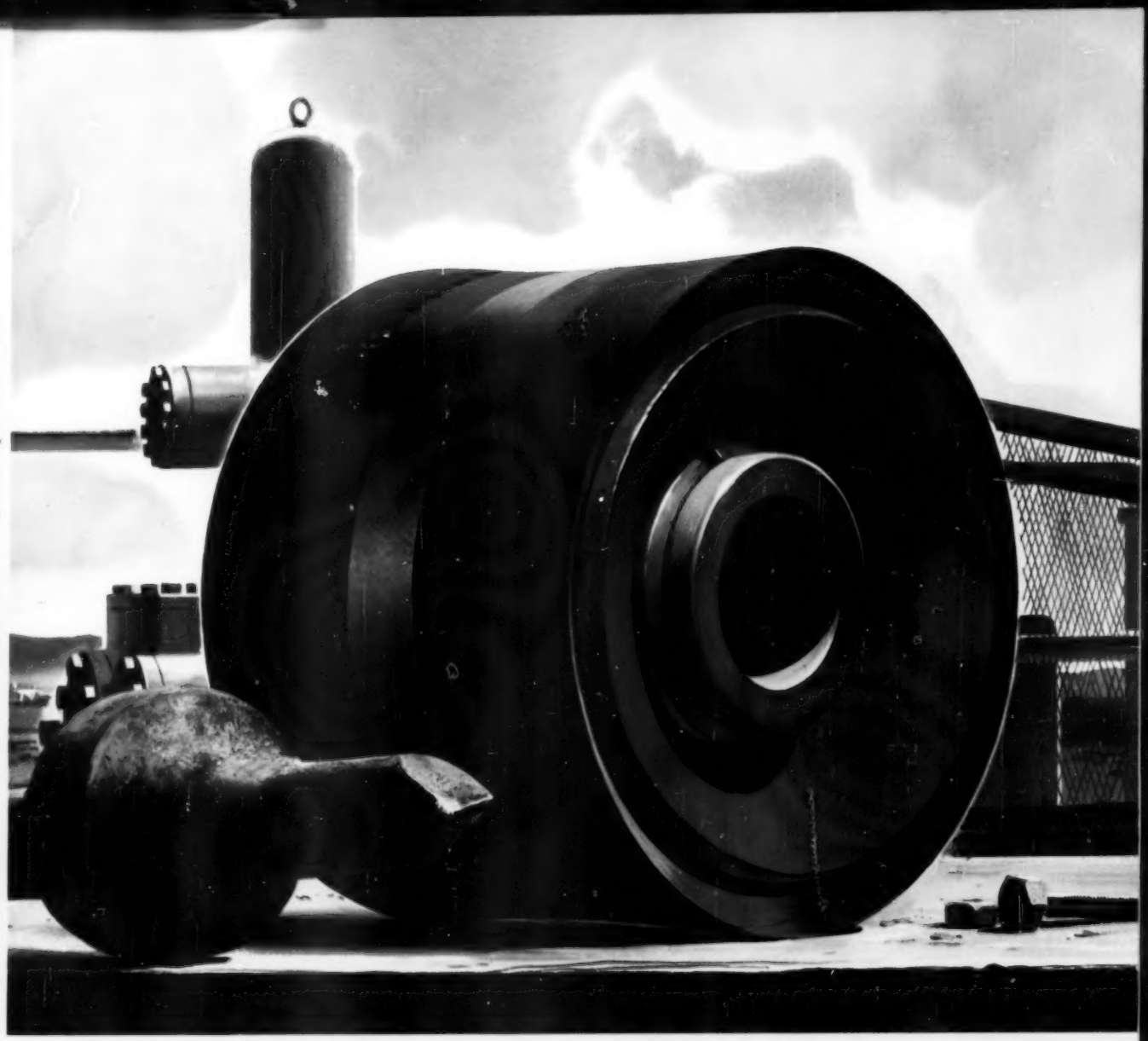
Or, if you don't require high pressures, you can get far longer service life than before.

Why? There are many good reasons! In the past ten years for example, *27 improvements*



have been incorporated into Mission Pistons.

Most of these improvements, such as advances in piston rubber compounds, can't be seen, but they mean that today's Mission Pistons are giving excellent service under jet drilling conditions that would have been considered impossible only ten years ago.

In addition to the changes actually made, Mission Engineers have conducted *371 test pump laboratory and field tests on piston rubbers alone in just the last three years.* That's an average of over 120 tests per year.

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Here's a practical procedure in

Planning a chemical-cleaning program

Cosden uses blocked-out circulating systems and master schedule to expedite chemical cleaning of light-ends unit

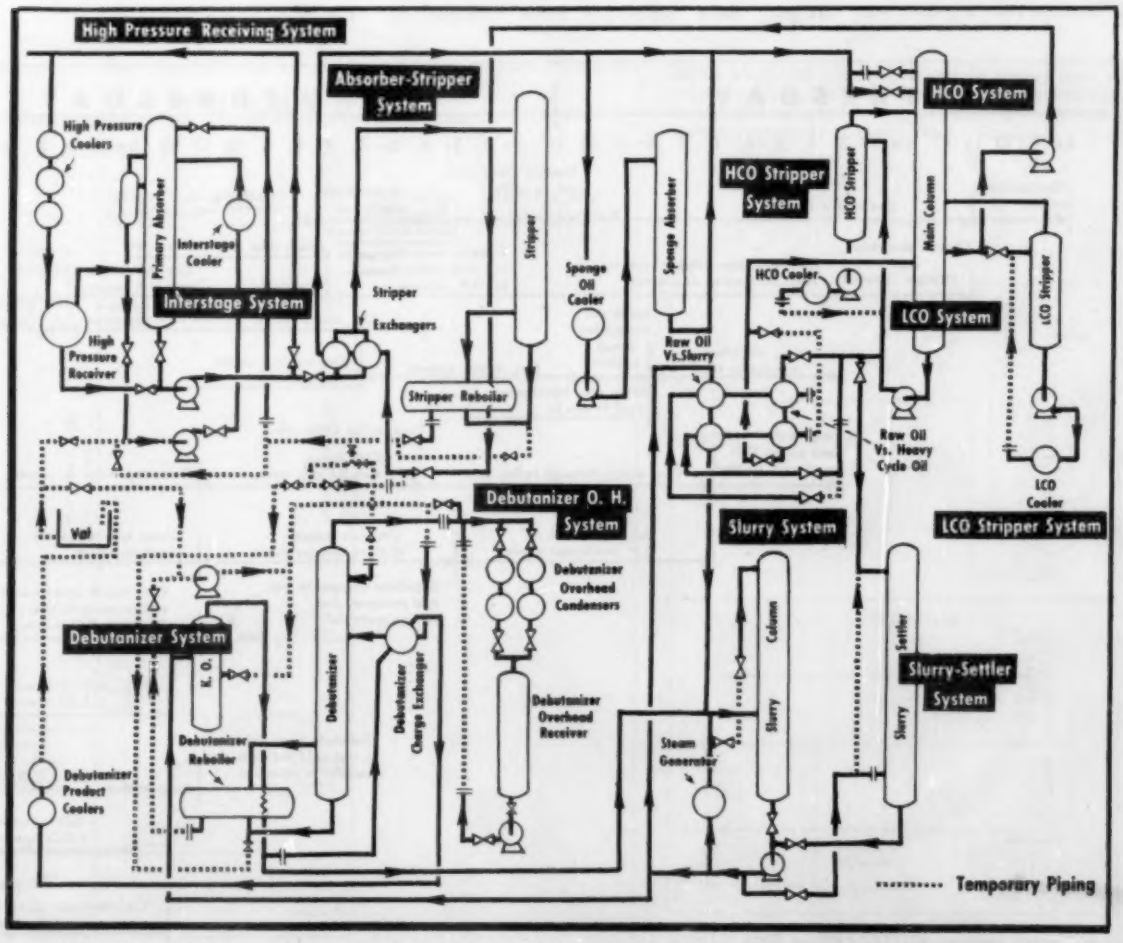
LARRY RESEN
Refining Editor

PREPLANNING a chemical-cleaning program and use of work sheets in its implementation can save time and money.

At its Big Spring, Tex., refinery, Cosden Petroleum Corp.'s planning engineers used a detailed scheduling sheet in setting up a cleaning program for a gas-recovery unit. They supplemented this with a unit flowsheet modified to show temporary connections required for the flow of chemicals. Net result was a smoothly operating setup shoehorned into a tight turnaround schedule.

In the planning phase of the program, it was quite important to make sure that each tower, condenser battery, cooler, etc., was exposed to the chemical-cleaning compound. At the same time, it was desirable to use unit pumps for circulation wherever possible to permit several sections of the unit to be cleaned at the same time.

The planning group achieved these ends by breaking the unit into components, each of which could be isolated to become a single circulatory system. These components, when totaled up, included all of the equipment in the unit specifically earmarked for cleaning. These little systems were blocked out by using the unit flowsheet as a guide. Each component was checked through to insure that all pieces of equipment would be cleaned and that flow lines and a pump were available to set up circulation throughout the component. In those instances where existing lines were insufficient for this purpose, temporary lines were used. Again, the flowsheet played an important part in determining where



GAS RECOVERY UNIT flow sheet shows individual circulating systems set up and temporary piping and pump used at Cosden Petroleum Corp.'s Big Spring, Tex., refinery during a chemical-cleaning program. Fig. 1.

temporary lines would be required.

Blocked-out systems . . . In referring to the modified flowsheet (Fig. 1), the individual circulating systems set up as a result of this study can easily be seen. The planning schedule (Fig. 2) shows how segments of the unit were circulated consecutively to enable the entire cleaning program to be concluded with a minimum of down time.

An important feature of the plan was the setting up of the individual circulating systems independent of the chemical vat. A central vat was used for preparing the chemical solution. In some instances it served as a receptacle for used solution which was pulled off a tower and then refortified before charging to another tower. Quite significantly, in only one instance was the vat used as part of a circulating system. This was the case in cleaning the debutanizer product coolers (shell) and debutanizer charge exchanger (tubes).

With this arrangement, the vat was available practically all of the time for preparing chemical solution. Once a blocked-out segment was charged with solution, circulation could begin here and a new batch prepared in the vat for charging to another system. This can be clearly seen by referring to the master schedule.

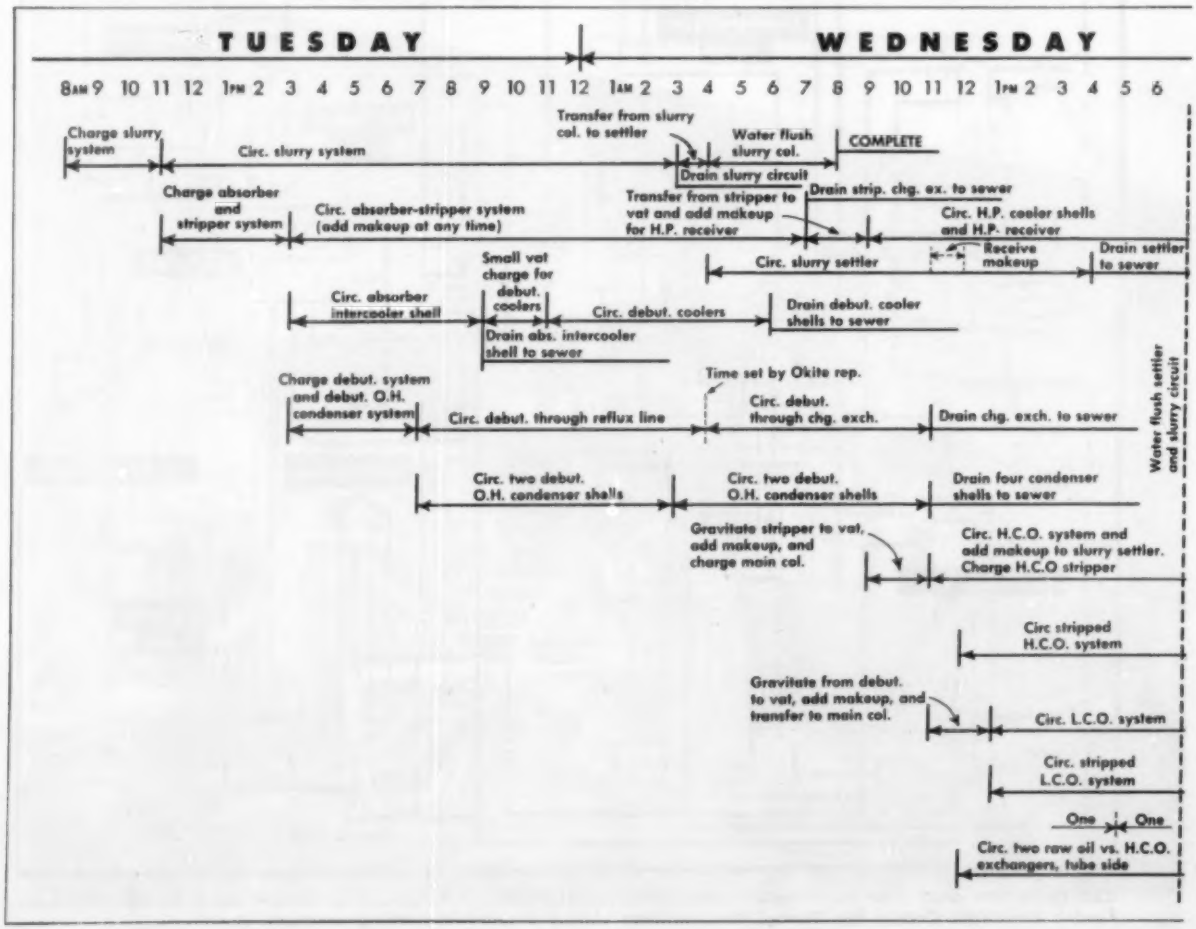
The initial operation at 8 a.m. Tuesday was to charge the slurry system. This took until 11 a.m. when circulation was begun. Immediately following this, the absorber and stripper system was charged. Chemical solution makeup was expedited by use of a Dempster "dumpster" scoop-type truck for handling chemicals.

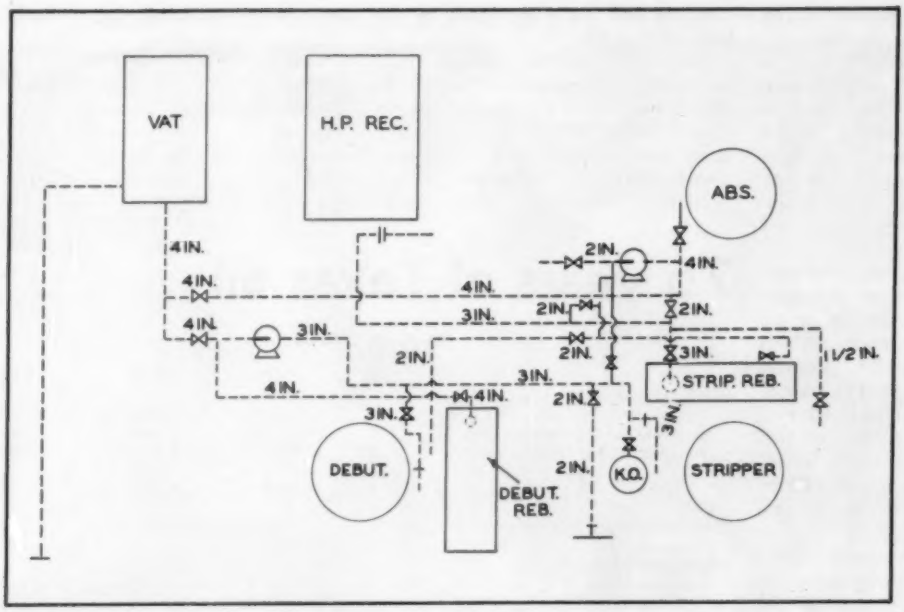
The vat used was a 5 by 4 by 20-ft. steel tank. A temporary chemical pump was used in conjunction with it for charging the various systems after which the permanent unit pumps were used for circulating purposes. This was a CRVH Ingersoll-Rand pump driven by a 25-hp. electric motor. The cleaning compound was Oakite 88 which was dissolved in water for all systems except the slurry system which required the addition of solvent.

The flowsheet as shown in Fig. 1 is the unit flowsheet modified to show temporary lines, indicated by dashes. At first glance, it appears as if considerable piping was required. However, in the light-ends unit arrangement of vessels actually required a modest amount of temporary piping as seen in the piping layout of Fig. 3.

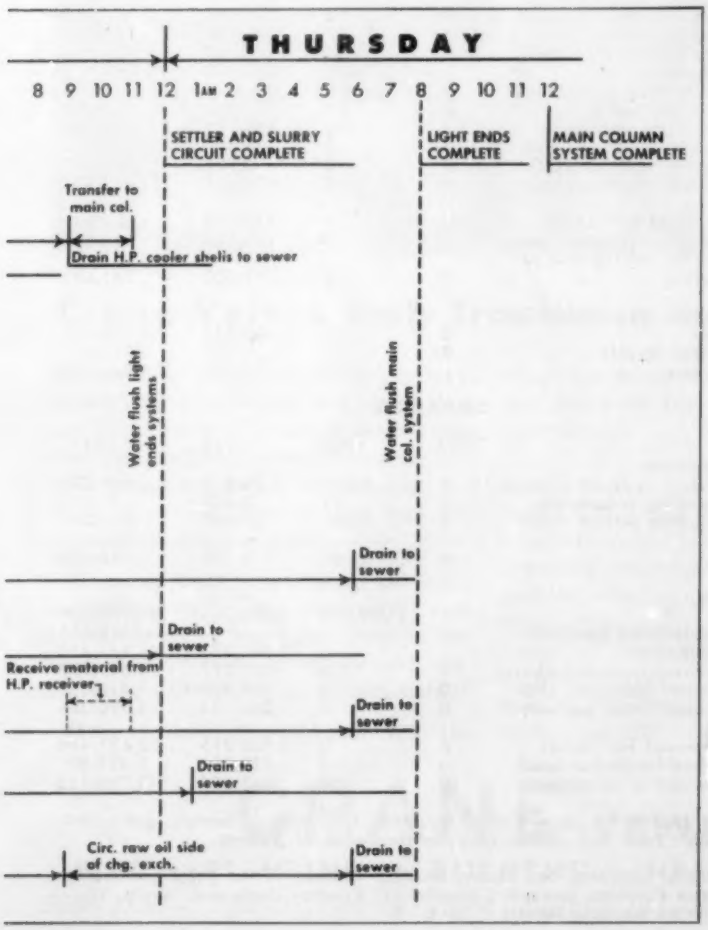
Several systems have been indicated on the modified flowsheet to show how connections were made to the vat to receive the chemical charge and how the piping was arranged to permit blocked-out circulation. Some of these blocked-out systems overlap, with some using the identical circulating pump. To avoid confusion not all of the blocked-out systems have been outlined on the flowsheet as reproduced.

Slurry system . . . How the flow chart and schedule work together can be best seen by studying in detail one portion of the flowsheet. The example chosen is the slurry column and settler seen in the lower right-hand section of Fig. 1. This is one of the cases where there is an overlap, with the same pump serving to circulate solution in two blocked-out systems Fig. 4.

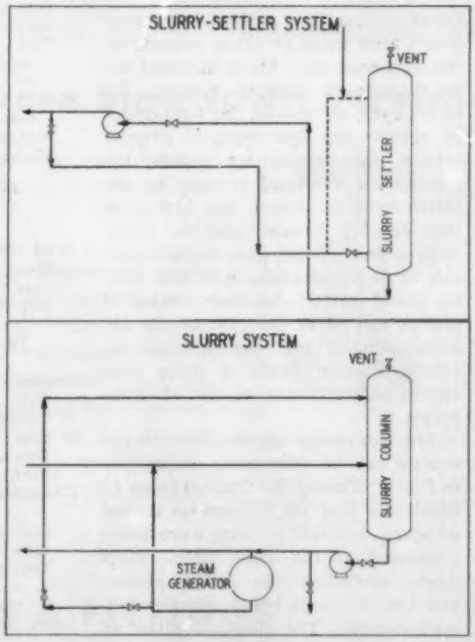

TUESDAY
WEDNESDAY
8AM 9 10 11 12 1PM 2 3 4 5 6 7 8 9 10 11 12 1AM 2 3 4 5 6 7 8 9 10 11 12 1PM 2 3 4 5 6
Charge slurry system
Circ. slurry system
Transfer from slurry col. to settler
Water flush slurry col.
COMPLETE
Drain slurry circuit
Charge absorber and stripper system
Circ. absorber-stripper system (add makeup at any time)
Transfer from stripper to vat and add makeup for H.P. receiver
Drain strip. chg. ex. to sewer
Circ. H.P. cooler shells and H.P. receiver
Circ. slurry settler
Receive makeup
Drain settler to sewer
Small vat charge for debut. coolers
Circ. absorber intercooler shell
Circ. debut. coolers
Drain debut. cooler shells to sewer
Drain abs. intercooler shell to sewer
Charge debut. system and debut. O.H. condenser system
Time set by Okite rep.
Circ. debut. through reflux line
Circ. debut. through chg. exch.
Drain chg. exch. to sewer
Water flush settler and slurry circuit
Circ. two debut. O.H. condenser shells
Circ. two debut. O.H. condenser shells
Drain four condenser shells to sewer
Gravitate stripper to vat, add makeup, and charge main col.
Circ. H.C.O. system and add makeup to slurry settler. Charge H.C.O stripper
Circ stripped H.C.O. system
Gravitate from debut. to vat, add makeup, and transfer to main col.
Circ. L.C.O. system
Circ. stripped L.C.O. system
One
One
Circ. two raw oil vs. H.C.O. exchangers, tube side



TEMPORARY PIPING required was quite simple and minor, as shown here. Flow sheet exaggerates extent of piping actually used. Fig. 3.


THURSDAY
8 9 10 11 12 1AM 2 3 4 5 6 7 8 9 10 11 12
SETTLER AND SLURRY CIRCUIT COMPLETE
LIGHT ENDS COMPLETE
MAIN COLUMN SYSTEM COMPLETE
Transfer to main col.
Drain H.P. cooler shells to sewer
Water flush light ends systems
Water flush main col. system
Drain to sewer
Drain to sewer
Receive material from H.P. receiver
Drain to sewer
Drain to sewer
Circ. raw oil side of chg. exch.
Drain to sewer

HOUR-BY-HOUR planning schedule shows how segments of the unit were circulated consecutively to enable the entire cleaning program to be concluded with a minimum of down time. Fig. 2.



SLURRY AND SLURRY-SETTLER systems were blocked out and run separately. A common pump, however, was used for circulating cleaning solution. Fig. 4.

The slurry column happens to be the initial system to be charged, and as was noted this began at 8 a.m. on Tuesday and continued until 11 a.m. The column was charged by connecting a 2-in. line downstream of the discharge of temporary chemical pump. The temporary 2-in. line ran to the debutanizer knockout drum. From here, permanent piping carried solution to the slurry column.

A temporary 3-in. jumper was connected between the steam generator and a line running to the top of the slurry column. In this manner it was possible to circulate the solution through the complete slurry column. This circulation continued until 3 a.m. Wednesday when the solution was transferred into the slurry settler. This took about an hour and the slurry column was then water-flushed 4 hours to complete this phase.

Circulation on the slurry settler began at 4 a.m. Wednesday using the same slurry pump as was used on the slurry column. Temporary piping was again required to provide a complete circuit. In this case, the piping was extended from the bottom inlet line to a point near the top of the settler. Solution was thus circulated down over the settler's internals and out through the bottom outlet line. The settler was circulated until 4 p.m. with a short 1-hour period around noon required to receive makeup solution. The settler was then drained and flushed with water.

Other systems . . . Similar arrangements were made on other systems on the light-ends unit. These included the heavy-cycle-oil stripper system, the heavy-cycle-oil system, the light-cycle-oil system, the light-cycle-oil stripper system, the debutanizer system, the debutanizer overhead system, the absorber-stripper system, the high-pressure receiver system, and the interstage cooler system plus the debutanizer coolers and exchangers and coolers noted earlier. Another overlap of pumps existed in the case of the absorber-stripper and high-pressure receiver systems. Both of these were circulated by means of the absorber pump.

The advantage of blocked-out operation can be seen quite graphically in Fig. 2. During the interval from 12 noon to 4 p.m. on Wednesday a total of seven different systems were being circulated at the same time. Most times, excluding the initial phases, five systems were being circulated simultaneously. The chemical phase of the operation was completed at 8 a.m. Thursday when three systems were drained. Water flushing followed to complete the entire program by 12 noon of that day.

Preplanning in this situation paid dividends. Elimination of the vat in all but one of the circulation systems played an important part in cutting down over-all down time. With turnaround time at a premium it was possible to squeeze this entire operation into an extremely tight schedule.

Acknowledgments

Cooperation of the management of Cosden Petroleum Corp. in the release of this information and the assistance of W. D. Broughton, planning engineer, in its preparation is gratefully acknowledged.

75 years of Texas oil

By C. A. Warner*

	1883	1908	1933	1957
Well completions:				
Oil wells	0	497	4,745	12,205
Gas (including condensate)	1	12	140	1,305
Dry (including service wells)	0	175	1,674	7,842
Total	1	684	6,559	21,352
Miles of hole drilled		(not available)		17,015
Plants (number of):				
Carbon black	0	0	29	17
Cycling	0	0	0	28
Gasoline	0	0	116	209
Refineries	0	8	165	54
Pipelines (in miles):				
Exclusive of gas distribution	0	825	41,178	87,103
Production:				
Producing counties	1	18	117	209
Producing oil wells	0	2,369	48,100	176,705
Producing days (state-wide)		366	365	171
Oil production	0	11,206	402,140	1,055,610
Condensate (from gas wells)	0	(included in oil)		31,883
Producing gas wells	2	23	1,560	13,681
Gas production (marketed)		neg.	475,691	4,827,268
Gas exported (included above)	0	0	101,537	2,610,133
Plant liquids (gasoline, LPG)	0	0	8,727	162,479
Carbon black (from gas only)	0	0	218,655	467,882
Gas processed for liquids	0	0	532,148	5,301,946
Gas burned for carbon black	0	0	138,231	146,573
Gas used for cycling and repressuring	0	0	1,000	741,691
Proven reserves (estimated):				
Crude oil	0	(?)	6,000,000	14,555,140
Natural-gas liquids	0	(?)	(?)	3,271,617
Natural gas		(?)	(?)	113,084,518

CUMULATIVE

	1883	1908	1933	1957
Well completions:				
Oil	1	4,502	76,110	269,178
Gas (including condensate)	2	92	4,415	17,508
Dry (including service wells)	3	2,087	37,667	132,268
Total	6	6,681	118,192	418,954
Production:				
Oil		129,054	3,464,081	20,772,340
Condensate (from gas wells)	0			†312,654
Gas (marketed)		neg.	3,680,273	56,961,450
Gas exported (included above)	0	0	423,277	24,641,277
Plant liquids (gasoline, LPG)	0	0	89,959	1,712,857
Carbon black (from gas only)	0	0	1,366,104	14,050,384
Gas processed for liquids	0	0	3,936,215	62,831,410
Gas burned for carbon black	0	0	872,261	7,422,801
Gas returned to formations	0	0	5,000	12,788,485

Note: Figures for oil and plant liquids in thousands of barrels, gas in millions of cubic feet, and carbon black in thousands of pounds.

*Petroleum consultant, San Jacinto Building, Houston. From paper presented at eleventh Texas Petroleum Research Committee Oil Recovery Conference, Austin, Tex.

†For period beginning January 1, 1940.

Gasoline plant changes valves . . . ends leaks . . . saves money

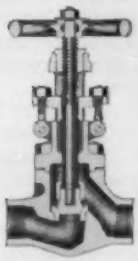
Crane Valves Stop Trouble in Severe Blowdown Service

This large Southwestern gasoline plant was troubled by leaky, lubricated plug valves used on 900-pound blowdown service lines from gas scrubbers. Water, scale, dirt and other foreign matter cut out the plugs and seats. Valve maintenance costs rose and scrubber efficiency dropped.

It's more than a year since the plant replaced the costly plug valves with Crane 1-inch, 600-pound forged steel globe valves. Today these Crane valves, operated several times daily, continue to seat tightly.

With the leakage problem licked, the plant has saved money on maintenance, and improved the efficiency of scrubber operations.

Got a leaky valve problem of your own? Your Crane Man will have the economical answer. He and Crane have been providing solutions to valve and fittings problems for many years—all based on thorough knowledge of oil and gas industry needs . . . Crane know-how in design and manufacturing . . . Crane dependable quality. Take it up with your Crane Man on his next call.



Rugged Crane 600-pound globe valve seating is famous for resistance to foreign matter and wire-drawing. Better design and materials do it!

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers Serving All Areas

An old barge plus new machinery means a

Modern rig for efficient drilling

of 12¼-in. hole to 13,000 ft.

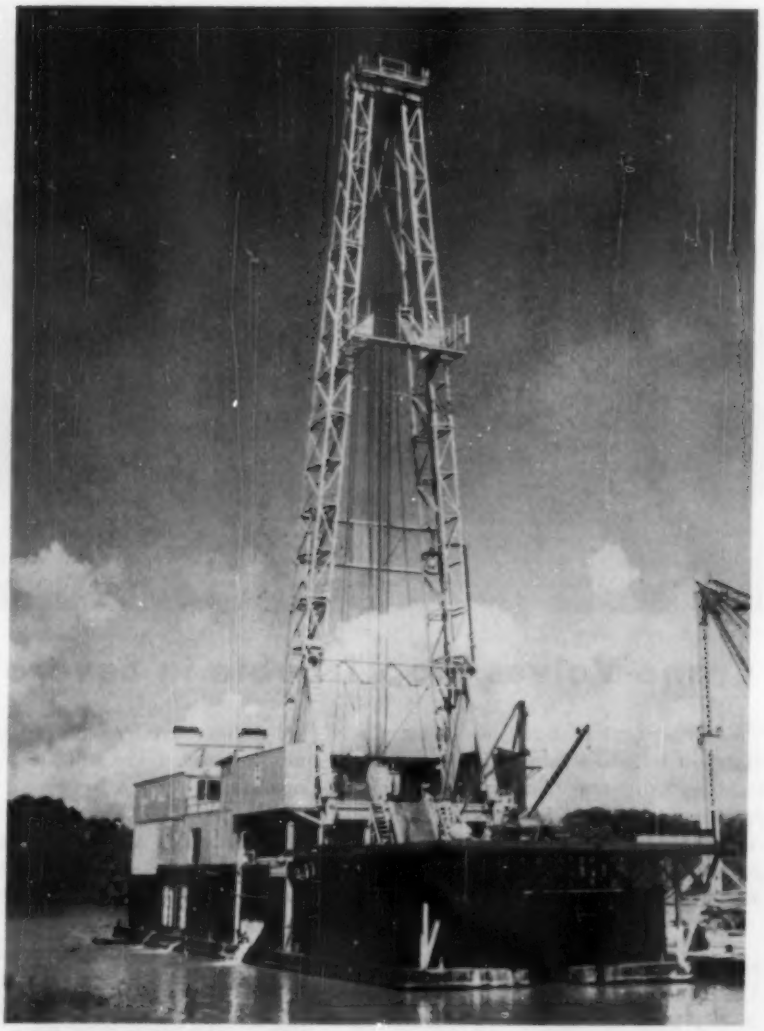
A NEW RIG has just been placed in service by Two R Drilling Co., of New Orleans, with which it expects to drill as much as 13,000 ft. of 12¼-in. hole efficiently and on a routine basis.

Two R doesn't consider the barge rig primarily a super deep-hole rig. But, for its assigned job, the rig has plenty of horsepower, large mud pumps, speed flexibility, a large-capacity mast, and more working space than is normally available on barges.

Had old rig, good barge . . . Two R already had a good barge hull but the rig on it was old. The company decided early this year to modernize the rig to be able to drill more competitively. The large hull, built in 1953, was in excellent condition and needed no major modification. Its size, 170 by 45 by 12 ft. deep, was big enough.

The working-floor level was set at 24 ft. above the barge deck to leave plenty of room for blowout preventers. To eliminate overly long chain drives between this working floor and the main barge deck, the draw works was placed on the main deck. This draw works, shown in Fig. 2, is powered from a mechanical compound. Shown in Fig. 3 are three 504-hp. diesel engines which are fitted with torque converters and drive into the compound.

Three different braking systems are available for control of the main draw works. The counterbalanced mechanical system is extremely easy to operate, and for emergency use an air brake can be applied at either the drilling console or at the draw works in the main machinery space on the first deck. The third brake is of electric-magnetic-particle design with automatic feedoff control. Since this brake has a torque capacity which is independent of rotating speed it can be used to control feedoff on the bit. In case of a twistoff the circuit is so arranged that it will hold its position at that point. Engine-throttle controls and pump-clutch controls can also be controlled either from the floor or the main deck.



THE DRILLING BARGE "Two R," although expected to drill as much as 13,000 ft. of hole, is not considered by its operators as primarily a superdeep-hole rig. Fig. 1.

Also on the same main-deck level are two mud pumps which drive off the compound. See Fig. 4.

When the machinery had been installed, a 14-ft.-high watertight sea wall was built to enclose it up to the second deck.

Powerful pumping system . . . The barge "Two R" has one of the most powerful mud pumping systems ever installed. Maximum horsepower available to the main mud pumps totals 2,500 and either mud pump can be driven at 2,000 hp. at top speed with

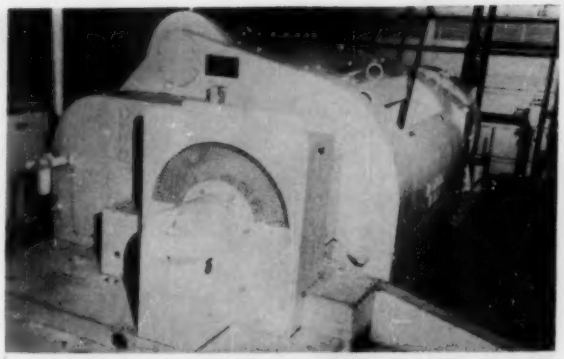
three engines. Two engines will drive one pump at 70 s.p.m. and 1,600 hp. The torque converters permit complete speed flexibility from 0 to 90 s.p.m. with a working pressure of 4,570 psi. on 6-in. liners.

These main mud pumps have forged-steel fluid ends, a development of the past year. Piston-rod load capacity is 129,200 lb.

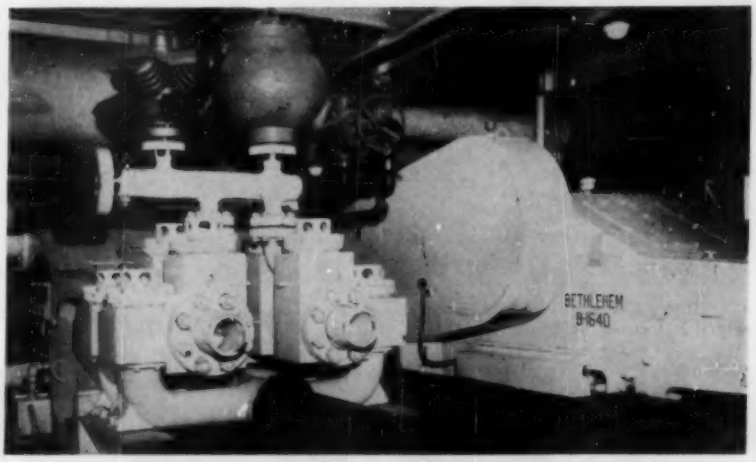
The 6-in. discharge system is equipped with the new 6-in. Series 1500 Cameron Series F Valve in lieu of conventional-type mud valves.

Forward of the three mud pumps are located the active mud tanks consisting of desander tank, slugging tank, settling tank, and suction tank. Capacity of this system is 900 bbl. and suction connections are provided so that any pump can take suction from any tank. Reserve mud pits are on the main deck aft of the mast substructure along with potable water and fuel-oil storage.

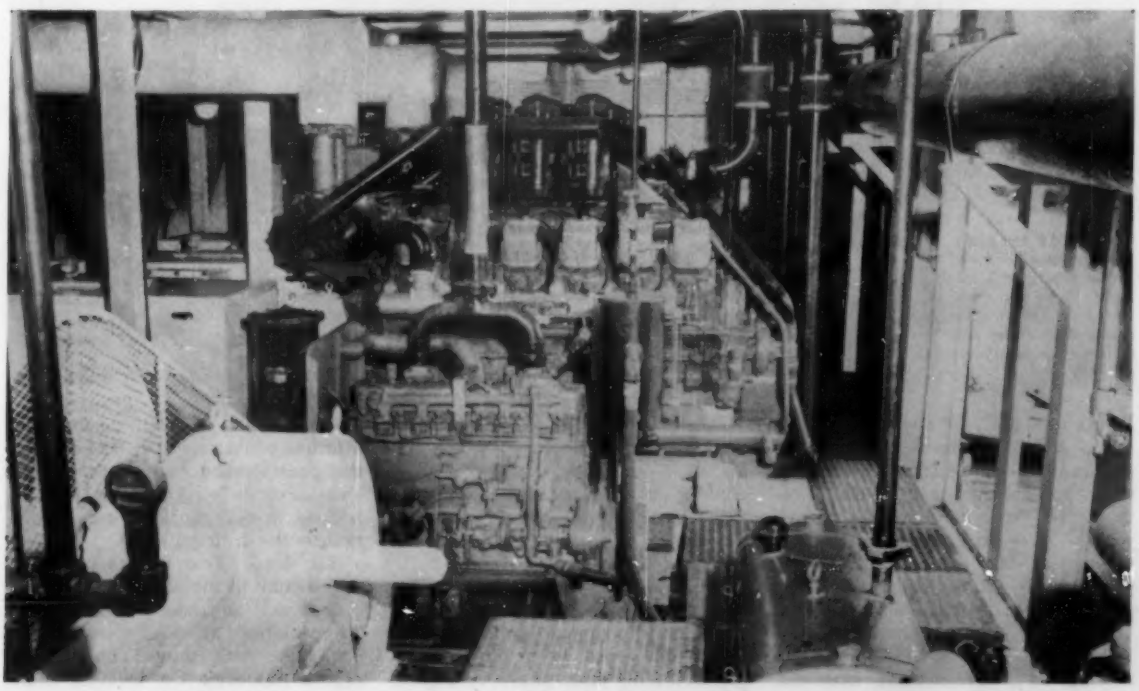
The second deck of this barge contains the auxiliary machinery space, storeroom, crew-change room, and dry-mud-storage room over the mud tanks. Sack mud is fed into hoppers and dropped between two 10-hp. electric agitators for complete mixing. The agitators are so spaced that they can turn the mud in the 19 by 19 ft. suction tank once a minute. Sack mud and chemicals are lifted to the second-deck storage area by means of an elevator powered by an air hoist.



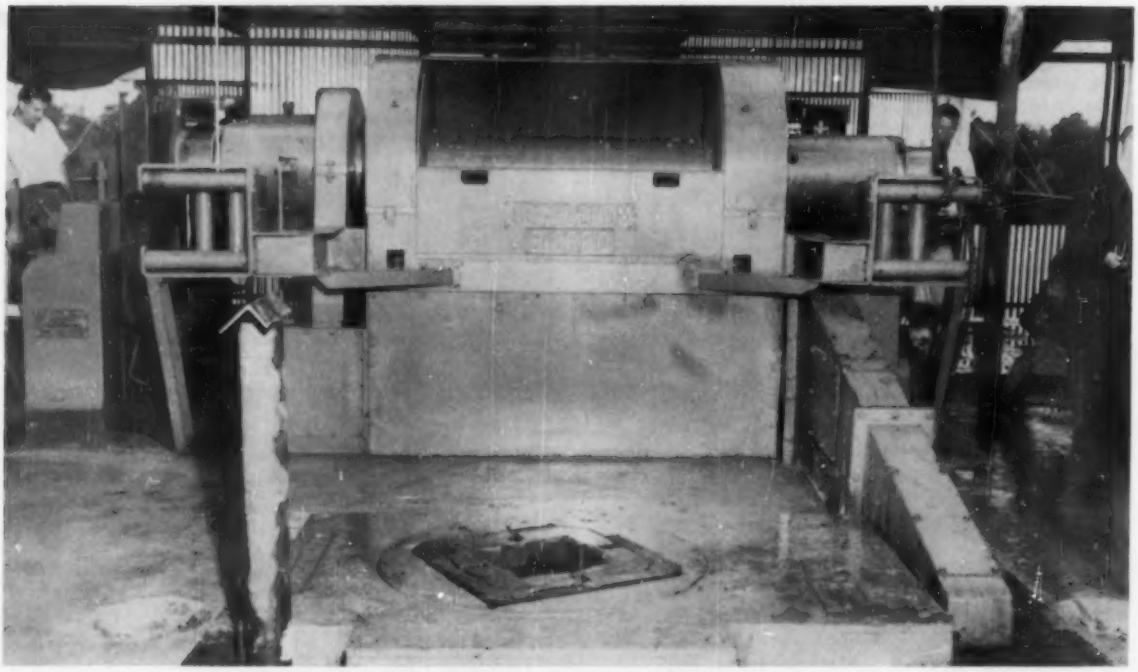
B-3661 DRAW WORKS is located on main first deck of drilling barge. Fig. 2.



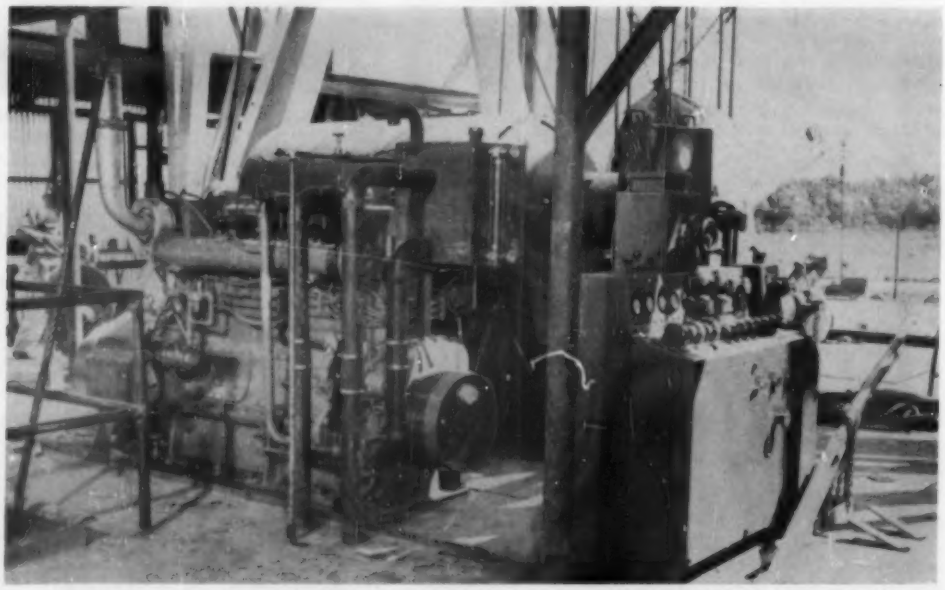
TWO large Bethlehem B-1640 pumps are used. Note the high-pressure forged-steel fluid end and the completely enclosed oil-bath chain-drive case. Fig. 4.



THREE 504-hp. diesel engines are fitted with torque converters and drive into the compound. Fig. 3.



CLOSEUP VIEW of derrick floors shows BCR-60 catworks, B-275 rotary and control panel (left) for B-3661 draw works, which is located on lower main deck. Fig. 5.



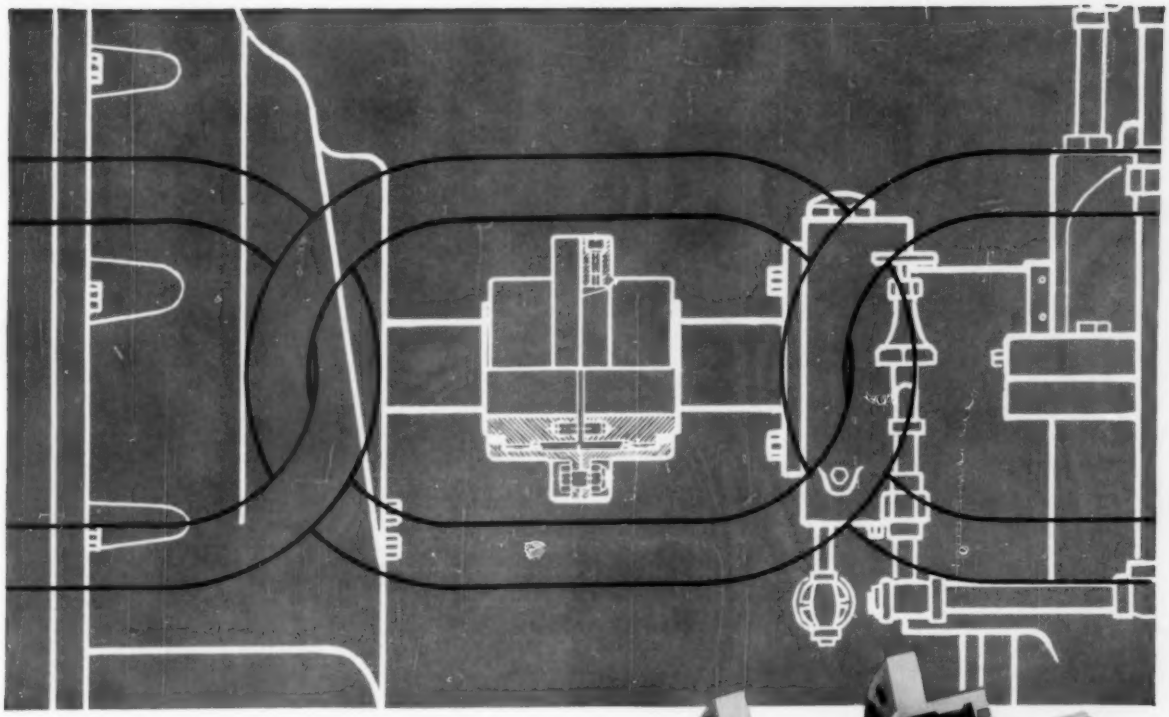
CONTROLS for both the catworks and draw works are at right. They are centralized in one panel for easy operation by the driller. Fig. 6.

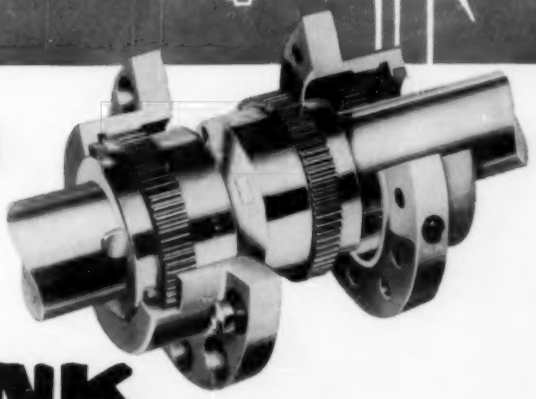
Plenty of space . . . The third deck is the drilling-floor level and has the spaciousness of a standard derrick with the convenience of a cantilever mast. The new mast is 142 ft. tall with a 32-ft. base and a 6-ft. clear opening beneath the crown block. It has an API equivalent derrick capacity of 1 million pounds.

The mast is also unique in that it is laid down toward the bow of the drilling barge rather than over the slot end. This puts the weight of the mast over that portion of the barge which has the most buoyancy and thereby decreases the draft. This is an open-type mast with maximum visibility. The mast can rack 17,000 ft. of 5-in. o.d. drill pipe.

To drive the B-275 rotary, catheading, and sand lining, the rig uses a new unit known as the BCR-60 catworks, developed by Bethlehem Supply Co. This unit, shown in Figs. 5 and 6 is rugged and of great capacity, powered by a 240-hp. engine with a torque converter. Fig. 6 also shows the controls for both the catworks and the draw works. They are centralized in one panel for easy operation by the driller (Fig. 6).

The barge Two R was placed in commission at the Morgan City yards of Reagan Equipment Co. on July 10. After testing all equipment at the dock, the unit moved immediately onto a California Co. location where it is at the time of this writing.





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SPECIFY THIS

POWER LINK

When a lot of time and effort have gone into the design of a piece of driven equipment, it makes sense to pick the power link carefully. Take a pump or compressor, for instance. No matter how well it is designed and built, for long service life and operating efficiency, it needs protection against strains due to misalignment.

Waldron gear couplings provide complete protection and positive, trouble-free drive because

They are strong . . . Hubs and cover sleeves for sizes 1¼A through 7A are machined from tough steel forgings. Hubs are keyed to the shafts. The two one-piece cover sleeves function as a single, rigid unit serving as a floating connecting link between the hubs. High strength of forgings makes possible a very compact coupling with low rotating inertia.

They are reliable . . . There are no flexible parts to bend or break and the coupling is dust, moisture, and oil tight. Patented Walflex seal is at the lowest possible diameter where centrifugal force is least. Clearance between teeth in hubs and sleeve is engineered so that an oil wedge always separates them, taking the wear.

They are available . . . Plenty of rough bore couplings, already assembled—on the shelf for *immediate* delivery. Finish bored standard couplings shipped to meet customers' schedules. We are geared up to give you realistic delivery on *any* type of couplings.

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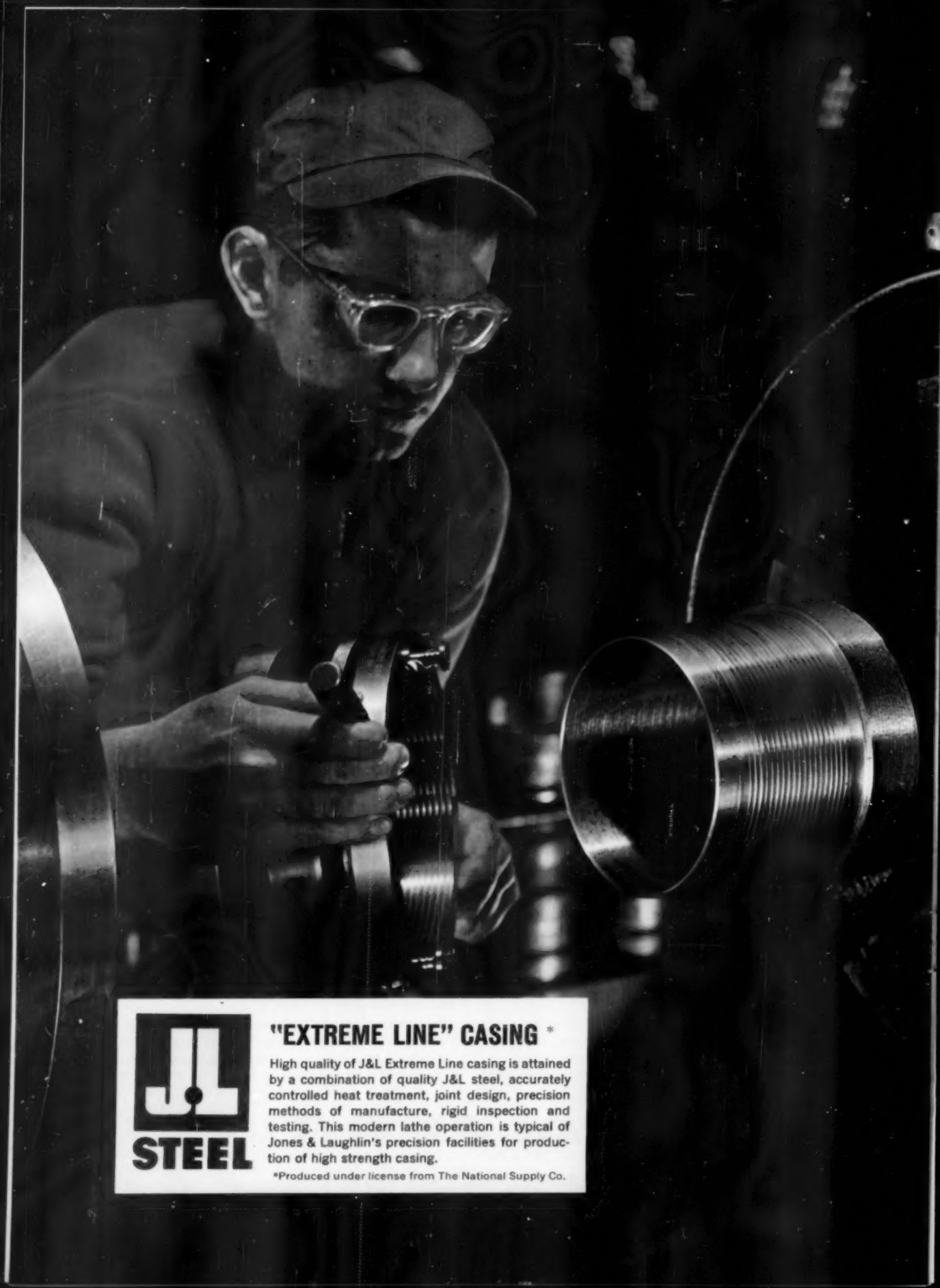


J&L STEEL

"EXTREME LINE" CASING *

High quality of J&L Extreme Line casing is attained by a combination of quality J&L steel, accurately controlled heat treatment, joint design, precision methods of manufacture, rigid inspection and testing. This modern lathe operation is typical of Jones & Laughlin's precision facilities for production of high strength casing.

*Produced under license from The National Supply Co.

J&L EXTREME LINE CASING "provides leak-resistant bottom-hole liner for Shell Oil well"

Over 1500 feet of 7-inch J&L Extreme Line casing were used as bottom-hole liner between 10,788 and 12,288 feet in this Shell Oil well in the Humphreys field near Gibson, Louisiana. "Extreme Line casing was used for its increased clearance and high leak resistance," said the Shell Oil drilling superintendent.

Some important advantages to be found in J&L's superior quality Extreme Line casing are:

HIGH JOINT STRENGTH. Modified Acme-type threads, with a steep flank angle, assure strong interlock. Integral joint eliminates coupling.

POSITIVE LEAK RESISTANCE. Accurately-machined metal-to-metal surfaces provide a positive seal.

INCREASED CLEARANCE. Reduced outside diameter of joints provides necessary clearance in a tight hole.

HIGH RUNNING SPEED. Running rates are up to 50% faster. Broad, flat-crested threads guide pin end quickly into engagement without cross-threading. Joints can be made up with two to four jerks after spinning.

Investigate unique features of J&L's Extreme Line casing, available in J-55, N-80 and P-110 grades. Ask your J&L distributor or write to Jones & Laughlin, 3 Gateway Center, Pittsburgh 30, Pennsylvania.

This L. D. Riggs #A-2 well was drilled to 12,300 feet with a large steam drilling rig. 1500 feet of 7-inch 29# P-110 Extreme Line casing were used. Shell also used 2987 feet of 13⅜-inch and 7089 feet of 9⅝-inch N-80 J&L casing in this well.

J&L STEEL

Jones & Laughlin Steel Corporation

PITTSBURGH, PENNSYLVANIA

1.

BECAUSE WE USED

TYPE C OTIS GAS LIFT VALVES

WE SAVED $1,800.00

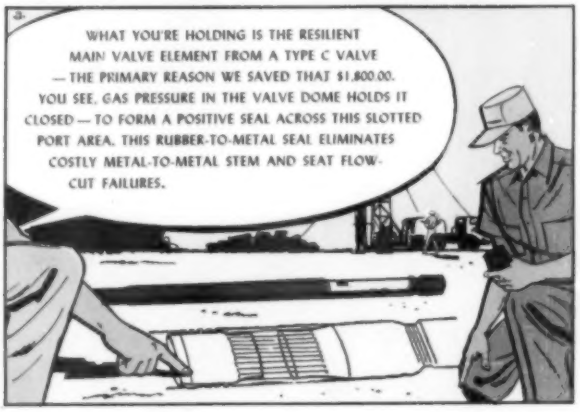
IN CONVERTING OUR #B-23 WELL FROM CONTINUOUS TO INTERMITTENT LIFT.

2.

THAT WOULD HAVE BEEN OUR COST TO EXCHANGE AND RERUN A STRING OF CONVENTIONAL INTERMITTING VALVES TO MAKE THE CONVERSION. BUT, BECAUSE OTIS TYPE C VALVES ARE DESIGNED FOR EITHER TYPE OF LIFT, WE JUST SHUT DOWN LONG ENOUGH TO INSTALL A SURFACE INTERMITTER AND PUT THE WELL BACK ON PRODUCTION. THAT'S WHY WE'RE RUNNING TYPE C'S HERE TODAY.

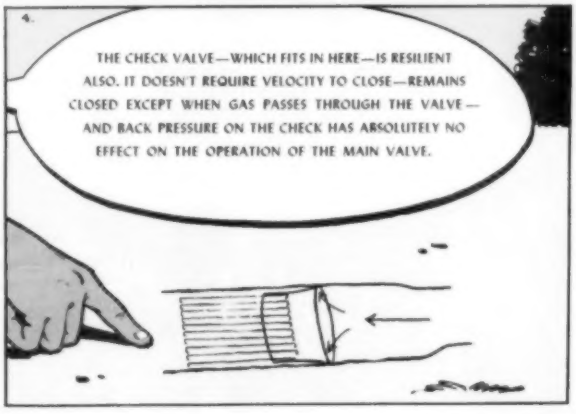
3.

WHAT YOU'RE HOLDING IS THE RESILIENT MAIN VALVE ELEMENT FROM A TYPE C VALVE — THE PRIMARY REASON WE SAVED THAT $1,800.00. YOU SEE, GAS PRESSURE IN THE VALVE DOME HOLDS IT CLOSED — TO FORM A POSITIVE SEAL ACROSS THIS SLOTTED PORT AREA. THIS RUBBER-TO-METAL SEAL ELIMINATES COSTLY METAL-TO-METAL STEM AND SEAT FLOW-CUT FAILURES.



4.

THE CHECK VALVE—WHICH FITS IN HERE—IS RESILIENT ALSO. IT DOESN'T REQUIRE VELOCITY TO CLOSE—REMAINS CLOSED EXCEPT WHEN GAS PASSES THROUGH THE VALVE—AND BACK PRESSURE ON THE CHECK HAS ABSOLUTELY NO EFFECT ON THE OPERATION OF THE MAIN VALVE.



5.

HERE, TAKE A LOOK AT THIS TYPE C VALVE. THERE ARE NO METAL MOVING PARTS—NO SEATS TO CUT OUT. IT'S FULL-OPENING — COLLAR-DIAMETER — AND CONCENTRIC DESIGN. THESE LAST THREE FEATURES MAKE IT THE ONLY FULL-OPENING VALVE THAT LETS YOU ROTATE TUBING IN A DUAL-COMPLETION, IF IT BECOMES NECESSARY.

6.

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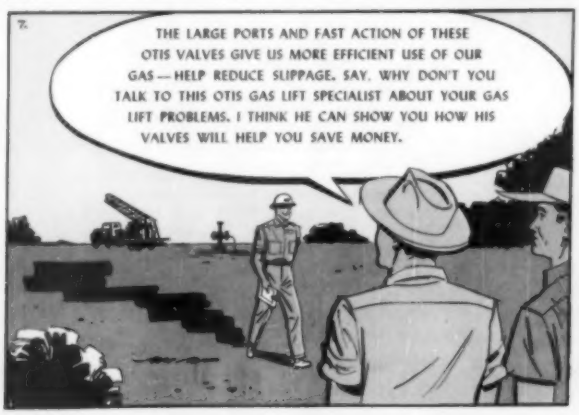

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An extension of Horner's method yields a new technique for

Calculating static bottom-hole pressures in a finite reservoir

BY LELAND L. HURST AND E. T. GUERRERO
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A MODIFICATION of the Horner method for calculating bottom-hole pressures from buildup data provides a correlation factor that reduces the error in most cases.

If a well is shut in for a long enough period of time, the bottom-hole pressure will approach the pressure existing at the external boundary of the reservoir. This is the static bottom-hole pressure. The rate at which the pressure builds up is a function of the properties of the reservoir rock and its contained fluid. In many cases this rate is low, and it is not economically possible to shut a well in long enough to obtain a true static pressure.

Horner[1] has developed a method of determining static bottom-hole pressures from buildup curves, based on the modification of the diffusivity equation for an infinite reservoir. An extension of his work is presented here, and proposes a correction factor to be applied to the method originally proposed by Horner.

The Diffusivity Equation

The equation governing the unsteady-state radial flow of a compressible fluid in a porous media, is expressed with pressure as a function of radius and time:

$$\frac{\partial^2 p}{\partial r^2} + \frac{1}{r}\frac{\partial p}{\partial r} = \frac{\phi \mu c}{K}\frac{\partial p}{\partial t} \quad (1)$$

Where:

p = reservoir pressure at distance r and time t.
c = compressibility of fluid.
μ = viscosity of fluid.
ϕ = porosity.
K = permeability.
t = time.
r = radius.

Many solutions of this equation for various boundary conditions exist in the literature.[4 5 6]

Horner presents an *exact solution* and an *approximate solution* to Equation 1 for the case of a single well in a finite reservoir. The assumptions made are:

1. Reservoir is homogeneous.
2. Reservoir is horizontal.
3. Uniform thickness throughout.
4. Fluid obeys Darcy's law.
5. Fluid is present in one phase only.
6. Compressibility essentially constant over the range of pressure and temperature involved.
7. Viscosity essentially constant over the range of pressure and temperature involved.
8. Density of fluid obeys an exponential type law.
9. One well in the reservoir.
10. Radial flow.

The exact equation . . . This is a solution of the diffusivity equation in which the well is treated as a mathematical sink in a finite reservoir, and is expressed as follows:

$$p_w = p_e + \frac{q_o \mu_o}{4\pi K_o h}\left[\frac{3}{2} + 2\ln\frac{r_w}{r_e} - \frac{r_w^2}{r_e^2} - \frac{4 K_o t}{\phi \mu_o c_o r_e^2} + 4\sum_{n=1}^{\infty}\frac{J_o(X_n r_w/r_e)}{X_n^2 J_o^2(X_n)} e^{-(X_n^2 K_o t)/(\phi \mu_o c_o r_e^2)}\right] \quad (2)$$

Where:

J_o = Bessel function of the first kind of order zero.
X_n = the nth root (in order of increasing magnitude of $J_1(x) = 0$.
J_1 = Bessel function of first kind of order unity.

The approximate equation . . . This is obtained by modifying a solution of Equation 1 for a well with an infinitely small radius in an infinite reservoir. This modification is accomplished by assuming:

1. Reservoir to have a radius r_e.
2. The pressure drop caused by a well in an infinite reservoir is less than the pressure drop caused by an identical well in a finite reservoir.
3. This pressure-drop difference is dependent on the quantity of fluid which flows in across the boundary r_e (equivalent to outer radius of finite reservoir) in the case of an infinite reservoir.

The quantity of fluid which flows across the boundary is expressed by:

$$\frac{q_o \mu_o}{4\pi K_o h}\left[\mathrm{Ei}\left(-\frac{r_e^2 \phi \mu_o c_o}{4 K_o t}\right) + \frac{4 K_o t}{r_e^2 \phi \mu_o c_o} e^{-(r_e^2 \phi \mu_o c_o)/(4 K_o t)}\right] \quad (3)$$

Where:

$\mathrm{Ei}\left(-\frac{r_e^2 \phi \mu_o c_o}{4 K_o t}\right)$ is the exponential integral of the quantity in parentheses.

When these terms are applied to the equation for the infinite reservoir they will yield the approximate equation as follows:

$$p_w = p_e + \frac{q_o \mu_o}{4\pi K_o h}\left[\mathrm{E_1}\left(-\frac{r_w^2 \phi \mu_o c_o}{4 K_o t}\right) - \mathrm{Ei}\left(-\frac{r_e^2 \phi \mu_o c_o}{4 K_o t}\right) - \frac{1}{(r_e^2 \phi \mu_o c_o)/(4 K_o t)} e^{-(r_e^2 \phi \mu_o c_o)/(4 K_o t)}\right] \quad (4)$$

which can be used for the case of one well at the center of a finite reservoir.

The two equations differ in that the *exact equation* is a mathematical solu-

tion of the diffusivity equation which assumes a single well in the center of a finite reservoir while the *approximate equation* is a modification of the mathematical solution for an infinite reservoir.

Evaluation of Equations

An evaluation of the two equations is made for comparative purposes.

Exact equation . . . Before evaluating the equation, some simplifications and groupings of terms were made:

1. The quantity $J_o(X_n r_w/r_e)$ is approximately equal to 1.00000 for the range of values used in evaluating these equations.

2. $\Delta p_E = (p_e - p_w) \dfrac{4\pi K_o h}{q_o \mu_o}$.

The variable Δp_E is dimensionless pressure drop for the *exact equation* and corresponds to the difference between static and well-bore pressures.

3. $R_n = -\dfrac{3}{2} - 2 \ln \dfrac{r_w}{r_e} + \dfrac{r_w^2}{r_e^2}$

and R_n becomes a constant for any particular value of the ratio r_e/r_w.

4. $T = \dfrac{K_o t}{\phi \mu_o c_o r_e^2}$.

The parameter T is dimensionless time and for any specific set of reservoir conditions is directly proportional to producing time t.

5. The term

$$-4 \sum_{n=1}^{\infty} \frac{e^{-X_n^2 T}}{X_n^2 J_o^2(X_n)}$$

is a variable and requires for its evaluation the use of a table of Bessel functions.[7] For small values of T, this term must be evaluated to the eighty-fifth root of $J_1(x) = 0$ to obtain five-place accuracy. Making these substitutions in Equation 2, we get:

$$\Delta p_E = R_n + 4T - 4 \sum_{n=1}^{\infty} \frac{e^{-X_n^2 T}}{X_n^2 J_o^2(X_n)} \quad (5)$$

Approximate equation . . . Using dimensionless time as defined above, the approximate equation becomes:

$$\Delta p_{Ei} = -\text{Ei}(-r_w^2/4T r_e^2) + \text{Ei}(-1/4T) + 4T e^{-1/4T} \quad (6)$$

Where:

Δp_{Ei} = dimensionless pressure drop for the *approximate equation.*

The terms involving Ei $(-u)$ are variable and require the use of exponential integral tables to evaluate $-u$. The lower limit of the tables is 0.0001. For values of $(-u)$ below 0.0001, the following approximation is sufficiently accurate:

$$\text{Ei}(-u) \approx \ln u + 0.5772$$

Where:

$$\text{Ei}(-u) = -\int_u^{\infty} \frac{e^v}{v} dv$$

Results of evaluation . . . The range of values of dimensionless time T used to evaluate the two equations was from 0.0001 to 1,000,000.

For each value of T two solutions of the equations were made for ratios of $r_e/r_w = 1{,}250$ and 5,000. Here r_e/r_w is the ratio of the radius of drainage to the radius of the well bore. These ratios are for 10 and 160-acre spacing respectively with r_w equal to 0.25 ft.

It was found that the ratio r_e/r_w had no effect on the difference between Δp_{Ei} and Δp_E for the various values of T.

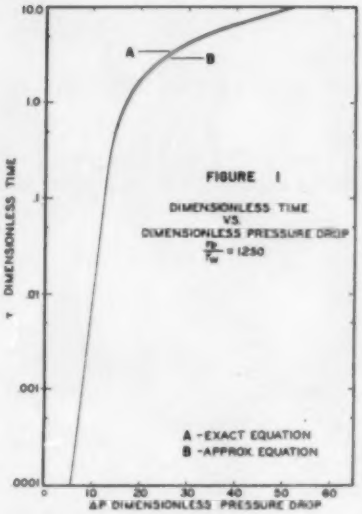
Fig. 1 shows a difference in the value of Δp for the two equations for values of $T > 0.1$. It is in this range of values of T that a correction factor is needed.

Correction factor . . . The correction factor is defined as:

$$L = \Delta p_{Ei} - \Delta p_E \quad (7)$$

This factor was obtained for various values of T from a plot of T vs. $\Delta p_{Ei} - \Delta p_E$. This appears as Fig. 2 for a range of T from 0.1 to 100.0.

Fig. 7 is a plot of correction in psi. vs. slope of the straight-line portion



of the curve and can be used directly to find the correction in pounds per square inch.

Below a value of $T = 0.1$, L becomes negligible and above $T = 10$, L approaches a constant value of 0.5000.

When the appropriate L is applied to the variable Δp_{Ei} obtained using the approximate equation, it is made numerically equal to Δp_E.

Calculation of Pressure-Buildup Curves

Ignoring the effects of afterproduction, the pressure in the well at any time $t + \theta$, or time θ after closing in, may be obtained by superimposing two solutions of either the exact or approximate equation.

Exact pressure-buildup equation . . . This equation is:

$$(p_e - p_w) \frac{4\pi K_o h}{q_o \mu_o} = \left[-\frac{3}{2} - 2 \ln \frac{r_w}{r_e} + \frac{r_w^2}{r_e^2} + 4(T+\theta) - 4 \sum_{n=1}^{\infty} \frac{e^{-X_n^2 (T+\theta)}}{X_n^2 J_o^2(X_n)} \right] - \left[-\frac{3}{2} - 2 \ln \frac{r_w}{r_e} + \frac{r_w^2}{r_e^2} + 4\theta - 4 \sum_{n=1}^{\infty} \frac{e^{-X_n^2 \theta}}{X_n^2 J_o^2(X_n)} \right] \quad (8)$$

Simplifying and grouping terms the exact pressure-buildup equation is expressed as:

$$p_w = p_e - \frac{q_o \mu_o}{4\pi K_o h} \left[\Delta p_{S(T+\theta)} - \Delta p_{S(\theta)} \right] \quad (9)$$

Where:

$T + \theta$ = producing plus shut-in time

expressed as dimensionless time.

Θ = shut-in time expressed as dimensionless time.

Approximate equation . . . This equation is:

$$(p_e - p_w)\frac{4\pi K_o h}{q_o \mu_o} = \left[-Ei\left(-\frac{r_w^2}{4(T+\Theta)r_e^2}\right) + Ei\left(-\frac{1}{4(T+\Theta)}\right) + 4(T+\Theta)e^{-1/4(T+\Theta)}\right] - \left[-Ei\left(-\frac{r_w^2}{4(\Theta)r_e^2}\right) + Ei\left(-\frac{1}{4(\Theta)}\right) + 4\Theta e^{-1/4\Theta}\right] \quad (10)$$

Simplifying and grouping terms, the approximate pressure - buildup equation is expressed as:

$$p_w = p_e - \frac{q_o \mu_o}{4\pi K_o h}\left[\Delta p_{Ei(T+\Theta)} - \Delta p_{Ei(\Theta)}\right] \quad (11)$$

Fig. 3 represents a generalized pressure-buildup curve for both an infinite and a finite reservoir. This article is restricted to the case of a finite reservoir only.

Comparison of Results

Using the two pressure - buildup Equations 9 and 11, curves were calculated using the following well conditions, units being in the c.g.s. system:

X_o = compressibility (oil)—1.8×10^{-4} vol./vol./atm.
K_o = permeability (oil) 0.002 Darcys.
μ_o = viscosity (oil)—0.5 cp.
ϕ = porosity—0.20.
r_w = radius of well—8 cm.
r_e = radius of drainage—10,000 cm.
h = pay thickness—304.8 cm.
p_i = initial res. pres.—400 atm.
t = producing time—900,000 sec.
θ = shut-in time—900 to 900,000 sec.
q = production rate (reservoir conditions)—92 cc./sec.

Fig. 4 shows that the two equations give different pressures in the straight-line portion of the buildup curve. This is to be expected because if $t + \phi$ and ϕ are expressed in terms of dimensionless time T, then T will have values of 0.001 to 2.0. From Fig. 2, the difference for Δp between the exact and the approximate equation can be obtained.

It can be seen from either Equation 9 or 11 that the magnitude of the correction is dependent upon the value of T and $q_o \mu_o / 4\pi K_o h$. In terms of the pressure-buildup curve the correction is dependent on the slope of the straight-line portion and total producing time.

Fig. 4 shows that the approximate equation yields the greatest error in the straight-line portion of the curve.

Application of Correction Factor

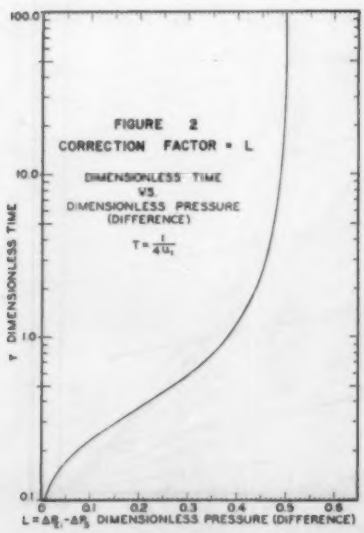
A series of pressure-buildup curves were calculated for different producing times using the exact pressure-buildup equation. The same well conditions were used as in Fig. 4. Pressure-buildup curves were calculated for producing times equal to 250, 500, 750, 1,000, 1,250, 1,500, and 1,750 hours. The times expressed as dimensionless times are T = 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, and 7.0 respectively. The shut-in time used was from 0.25 to 250 hours which corresponds to a Θ of 0.001 and 1.0 respectively. The buildup curves appear as Fig. 5, and will be used in obtaining static bottom-hole pressure by the Horner method and the modified Horner method (correction factor). (See Appendix A for sample calculations.)

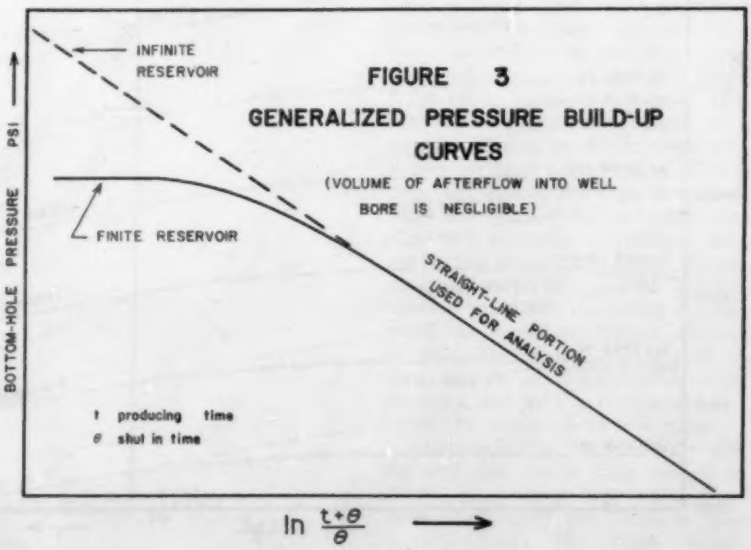
Horner Method

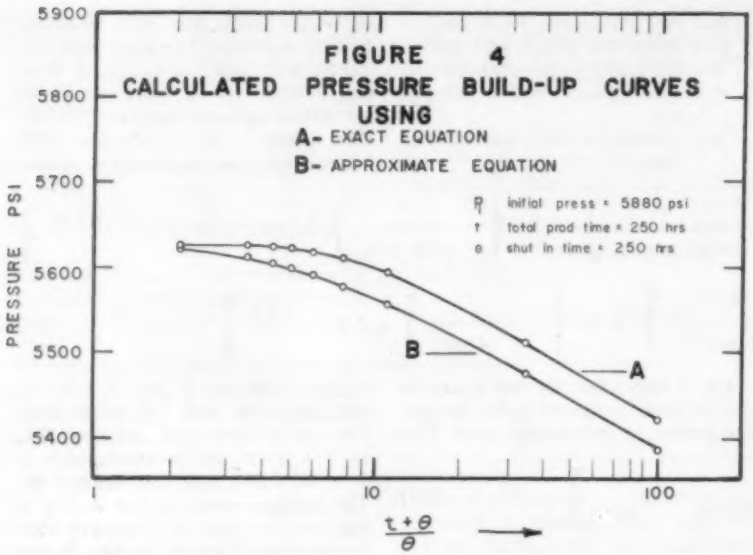
1. Extrapolate the straight-line portion of buildup curve to $(t + \theta)/\theta = 1.0$ on semilog paper. This corresponds to infinite shut-in time.

2. The pressure at this point (p′) is not a true static bottom-hole pressure for a finite reservoir, but would correspond to the static reservoir pressure in an infinite reservoir.

The relationship between p′ and p_e for c.g.s. units, Equation 12, is obtained from Equation 10 by assuming that shut-in time θ is very small compared to producing time (t) and that for small values of (− u), Ei (− u) ≈ ln u + 0.5772. If the straight-line portion is extrapolated to







$(t + \theta)/\theta = 1.0$, then $\ln (t+ \theta)/\theta = 0$ and Equation 12 is obtained:

$$p' = p_e - \frac{q_o \mu_o}{4\pi K_o h} y (u_1) \quad (12)$$

Values for p', p_e, and $q_o \mu_o / 4\pi K_o h$ are known and Equation 12 can be used to solve for y (u_1).

3. Read numerical value of u from a plot of y (u) vs. u, as shown in Fig. 6.

4. Let the shut-in time θ in Equation 10 become infinite and obtain the following expression for static pressure (c.g.s. units):

$$p_s = p_e - \frac{q_o \mu_o}{4\pi K_o h} \times \frac{1}{u} \quad (13)$$

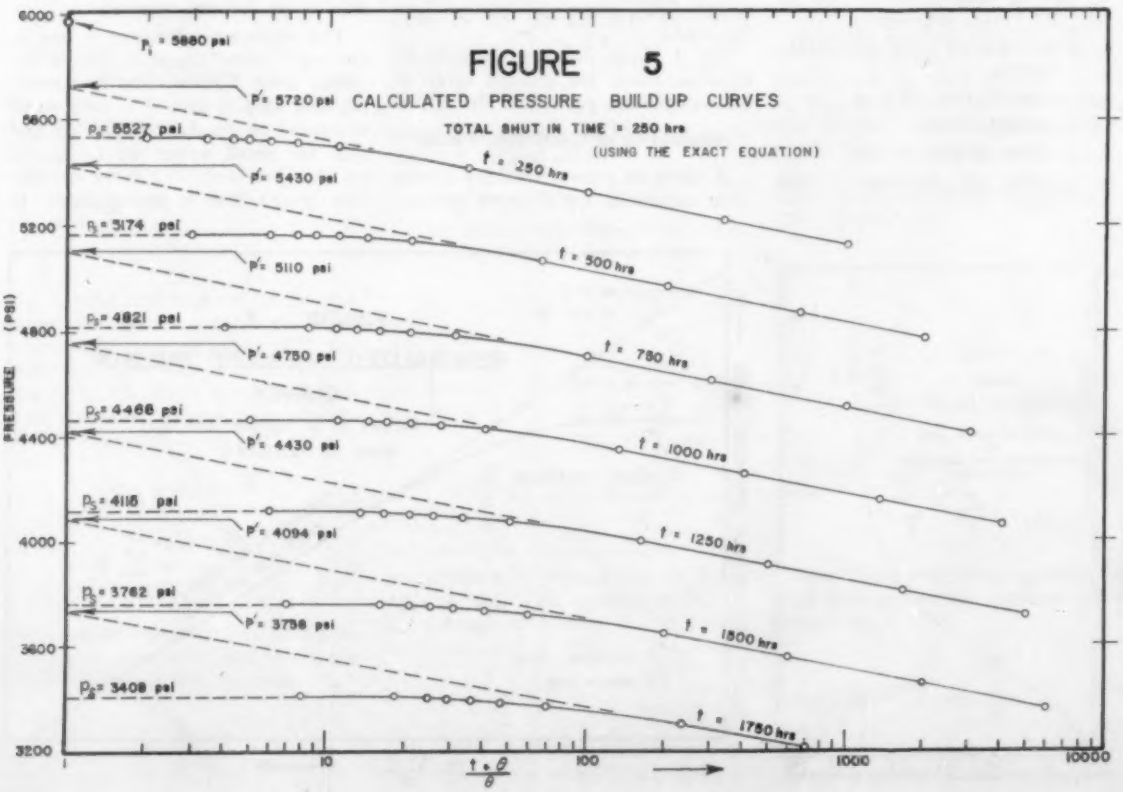
Use the value of u from Step 3 and solve Equation 13 for p_s.

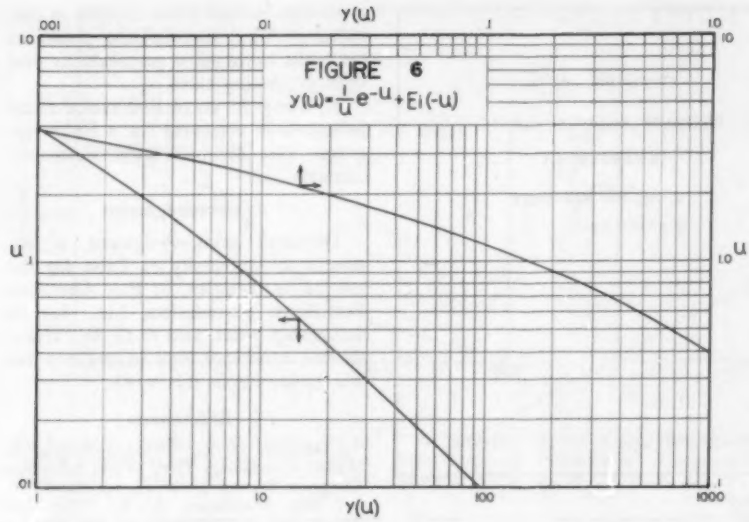
Modified method . . . At this point the correction factor L is applied. In Fig. 4, if the straight-line portion of the buildup curve (assuming that the exact equation represents a true buildup curve) is extrapolated to log $(t + \theta)/\theta = 1.0$, a p' will be obtained which is too high. Using this value of p' in Equation 12, a value of y (u) is obtained which is smaller than it should be. Therefore, the value of u from Fig. 6 will be large. When this larger value of u is used in Equation 13, it is used as 1/u and would therefore give a smaller pressure drop. This in turn gives a high static bottom-hole pressure (p_s). Therefore, the correction factor L is added to 1/u and the modified Horner equation for determining static bottom-hole pressure becomes (c.g.s. units):

$$p_s = p_e - \frac{q_o \mu_o}{4\pi K_o h} (1/u + L) \quad (14)$$

The correction factor, L, is taken from Fig. 2 corresponding to the value of T for the total producing time involved. Thus the modified Horner method will always give a lower value for calculated static bottom-hole pressure than the Horner method.

Calculated static bottom-hole pressures based on buildup curves appear in Table 1. Results by the Horner method and the modified Horner





method are compared. Standard oilfield units were used in these calculations.

The error involved (as indicated in Table 1) using the modified Horner method is well within the accuracy of present bottom-hole pressure measuring methods which have an approximate accuracy of 0.2% of the full pressure scale.[9]

Application to Field Data

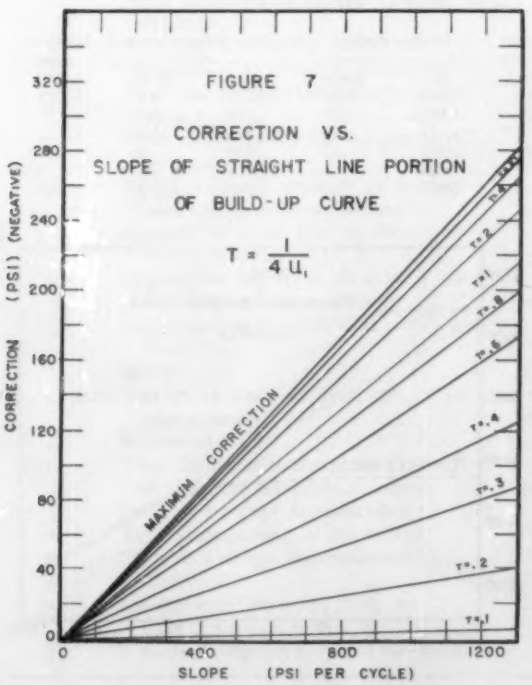
The correction factor is most significant in cases where the slope of the straight-line portion of the build-up curve (in psi. per cycle) is large. This condition would exist in a well having a high producing rate and a low permeability.

In applying this method to field data, several factors could affect the accuracy of the results:

1. Large reservoir pressure drop since the last pressure survey or since completion of the well. Here the assumption that the compressibility and viscosity are essentially constant would not hold true, especially below the bubble point.
2. Large producing time compared to shut-in time. This requires a longer extrapolation to determine (p'), and any error in determining the slope of the straight-line portion of the curve is magnified.
3. The method of obtaining producing time by dividing cumulative production from initial completion or last pressure survey by producing rate can give an erroneous value of t.
4. Selecting the straight-line portion of the curve is a matter of personal judgment and therefore is subject to error.

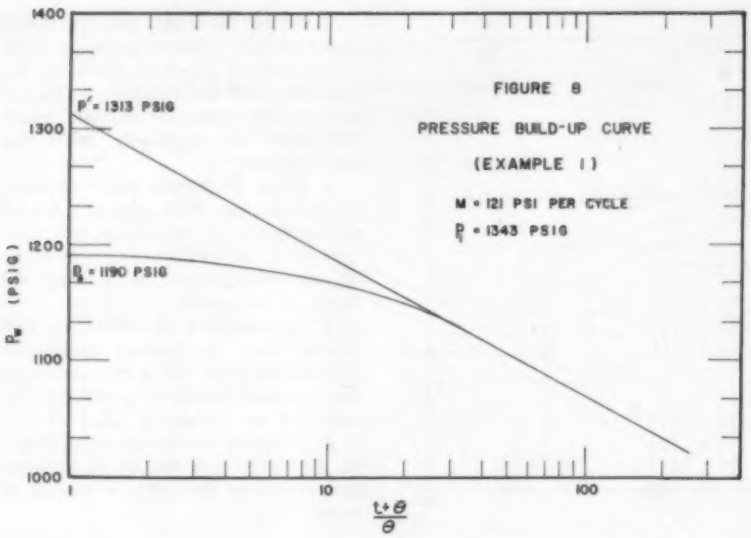
TABLE 1—STATIC BOTTOM-HOLE PRESSURE

Producing time (hours)	T	True static pressure (psi.)	Computed static bottom-hole pressure, psi.			
			Horner method		Modified Horner method	
			Pressure	Error	Pressure	Error
250	1	5,527	5,559	+32	5,526	− 1
500	2	5,174	5,215	+41	5,177	+ 3
750	3	4,821	4,867	+48	4,830	+ 9
1,000	4	4,468	4,496	+28	4,458	−10
1,250	5	4,115	4,150	+35	4,110	− 5
1,500	6	3,762	3,800	+38	3,760	− 2
1,750	7	3,408	3,460	+52	3,419	+11



Six field examples have been included. Example 1, Fig. 8, is taken from Horner's work. Example 2, Fig. 9, represents a well with a fairly high value of the slope of the straight-line portion of the curve (250 psi. per cycle). Example 3, Fig. 10, shows a case in which the producing time is large compared to the shut-in time. In Example 4, Fig. 11, the calculated static pressure is below the last measured pressure. This is a case where the pressure-buildup data are possibly in error or the selection of the straight-line portion of the curve could be in error. Example 5, Fig. 12, is a case where the producing time is very large compared to shut-in time with a resulting large pressure drop. Therefore, the assumption that compressibility and viscosity are essentially constant over the range of pressures does not hold. Since the slope of the straight-line portion of the buildup curve is small, the correction is small using the modified Horner method (5 psi.). This well was not shut in long enough to obtain a true static pressure, and only a comparison between the two methods was made.

Example 6, Fig. 13, is a case where the well was shut in long enough to obtain an apparent true static pressure. Here again the pressure drop is rather large. This could explain



why the modified Horner method was in error by 27 psi. In this case the buildup data were taken at a different depth (576 ft. higher) than the initial pressure and a correction was made using a gradient of 0.316 psi. per foot which could have introduced some error.

The results from the six examples are shown in Table 2. The apparent true static bottom-hole pressures were obtained by extrapolating the trend of the pressure-buildup curves in the near-static condition region. In this region, the variation of the bottom-hole pressure with time becomes very small or constant. Thus, in the case of all six examples cited, long shut-in periods were used.

In five of the six cases, the modified method gave a more accurate calculated bottom-hole pressure than the Horner method. In two cases the error was decreased by approximately 50%. Example 4 is not suitable for comparison because the pressure-buildup data for this well are obviously in error.

Example calculations of the application of both the approximate and modified equations are included in the appendix.

Conclusions

1. The magnitude of the error introduced in using Horner's approximate method of calculating static bottom-hole pressures is dependent on the value of $q_o \mu_o / 4\pi K_o h$ and dimensionless time T.

2. The correction factor L has the most significance when applied in calculating static bottom-hole pressures for wells having low permeability and high producing rates.

3. Using the correction factor static bottom-hole pressures for a finite reservoir can be calculated more accurately.

Acknowledgments

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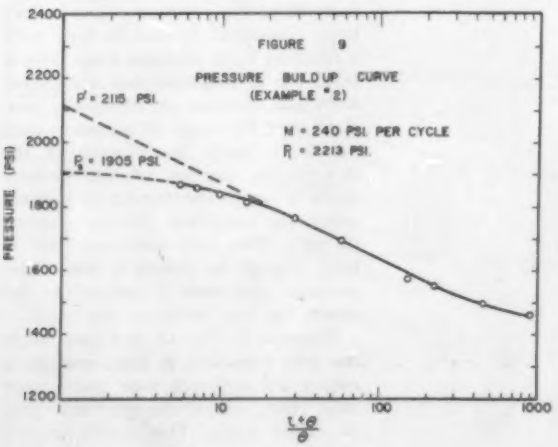
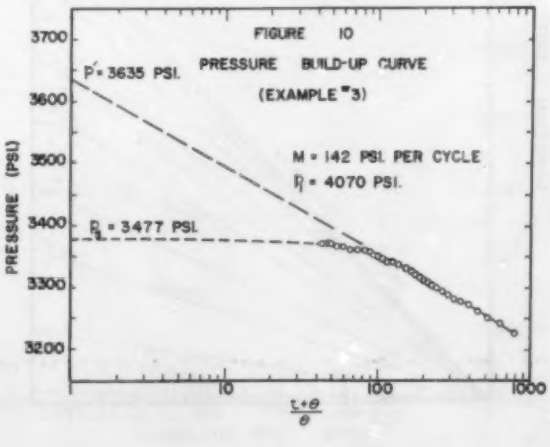
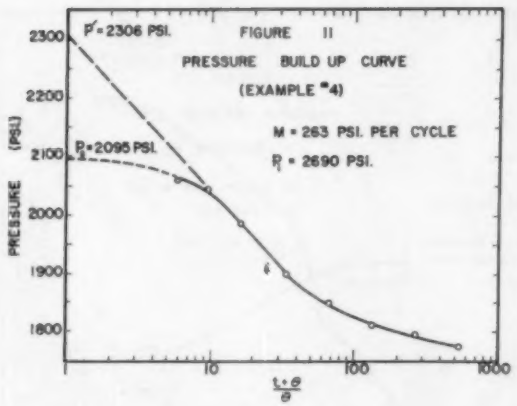
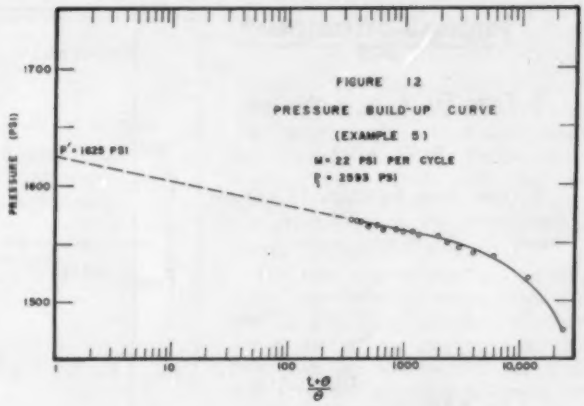
TABLE 2—STATIC BOTTOM-HOLE PRESSURES USING CORRECTION FACTOR AND ACTUAL FIELD DATA

Example No.	Apparent true static (b.h.p.)	Horner method		Modified Horner method		Improvement (psi.)
		p_s	Error	p_s	Error	
1	1,190	1,245	+55	1,232	+42	13
2	1,905	1,955	+55	1,923	+18	32
3	3,377	3,471	+97	3,443	+66	31
4	2,095	2,052	−43	2,005	−90	
5	....	1,579		1,574	..	5
6	1,918	1,959	+41	1,945	+27	14









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9. "Amerada RPG-3 Gage, Description and Operating Instructions," Geophysical Research Corp., Tulsa (1954), p. 4.

NOMENCLATURE

Symbol	Definition	C.g.s. unit	Oil field unit
A	Constant permitting use of psi, b.p.d., cp., md., ft., and $\log_{10}$ units	.....	70.60
B	Constant permitting use of ft.^{2}, psi., md., sec. units	.....	948.2
c	Fluid compressibility at reservoir conditions	vol./vol./atm.	vol./vol./psi.
c_o	Oil compressibility at reservoir conditions	vol./vol./atm.	vol./vol./psi.
G	Constant permitting use of ft., psi., md., b.p.d., cp., and $\log_{10}$ units	.....	162.5
h	Net sand thickness	cm.	ft.
K	Permeability	Darcy	md.
K_o	Effective permeability to oil	Darcy	md.
L	Dimensionless correction factor	.....	.....
ln	Logarithm to base e	.....	.....
log	Logarithm to base 10	.....	.....
M	Slope of proper portion of pressure-buildup curve	.....	psi./cycle
μ	Viscosity at reservoir conditions	cp.	cp.
μ_o	Oil viscosity at reservoir conditions	cp.	cp.
p	Reservoir pressure at distance r and time t	atm.	psi.
p_s	Sand face pressure for infinite shut-in time	atm.	psi.
p_e	Initial reservoir pressure or average reservoir pressure at last survey	atm.	psi.
p_w	Pressure at sand face at time t or during buildup	atm.	psi.
p'	Pressure at log $(t + \theta)/\theta = 0$ for finite boundary conditions	atm.	psi.
q_o	Constant rate of oil flow at reservoir condition	cc./sec.	b.p.d.
r	Radius	cm.	ft.
r_e	Radius to limits of reservoir or of drainage area	cm.	ft.
r_w	Radius of well	cm.	ft.
t	Time from initial completion of well or since the last pressure survey	sec.	hr.
T	Same as t except dimensionless	.....	.....
θ	Time since closing in the well	sec.	hr.
Θ	Same as θ except dimensionless	.....	.....
ϕ	Porosity	.....	.....
u	Independent variable given by $u = (r_e^2 \phi \mu_o c_o)/(4 K_o t)$	.....	.....
u_1	u made a constant for t not too large	.....	.....

APPENDIX A

Calculation of p_s Based on Theoretical Buildup Curves

Example of calculated p_s (static bottom-hole pressure). Using the buildup curve in Fig. 5 for a total producing time of 250 hours, a static bottom-hole pressure p_s was calculated:

$$T = \frac{0.000264\, K_o\, t}{\phi\, \mu_o\, c_o\, r_e^2} = \frac{1}{4\, u_1}$$

$$p' = p_e - A\,\frac{q_o\,\mu_o}{K_o\,h}$$

$$\times\ y\left(\frac{B\, r_e^2\, \phi\, \mu_o\, c_o}{K_o\, t}\right) \qquad (15)$$

1. From the extrapolated straight-line portion of the curve $p' = 5{,}720$ psi.

2. Slope of the straight-line portion of the curve:

$$\frac{5{,}520 - 5{,}322}{1\ \text{cycle}} = 198\ \text{psi./cycle}$$

Then: $$198 = G\,\frac{q_o\,\mu_o}{K_o\,h}$$

where G = conversion constant = 162.6.

Then:

$$198 = 162.6\,\frac{q_o\,\mu_o}{K_o\,h} \text{ and}$$

$$\frac{198}{162.6} = \frac{q_o\,\mu_o}{K_o\,h} = 1.218$$

3. Now using Equation 15:

$$5{,}720 = 5{,}880$$

$$- (70.6)\,(1.218)\,y\,(u_1)$$

$$160 = 86.2\,y\,(u_1)$$

$$y\,(u_1) = \frac{160}{86.2} = 1.86$$

4. From Fig. 6, u_1 is obtained:

$$u_1 = 0.268$$

5. Now using Equation 13 and the conversion unit A = 70.6, p_s is obtained by the Horner method:

$$p_s = p_e - A\,\frac{q_o\,\mu_o}{K_o\,h} \div (u_1)$$

$$p_s = 5{,}880 - \frac{70.6\,(1.218)}{0.268}$$

$$= 5{,}880 - \frac{86.2}{0.268}$$

$$= 5{,}880 - 321$$

p_s = 5,559 psi. by Horner method

6. Now using the modified Horner method (correction factor), p_s is obtained as follows:

$$p_s = p_e - A\,\frac{q_o\,\mu_o}{K_o\,h}\,(1/u + L)$$

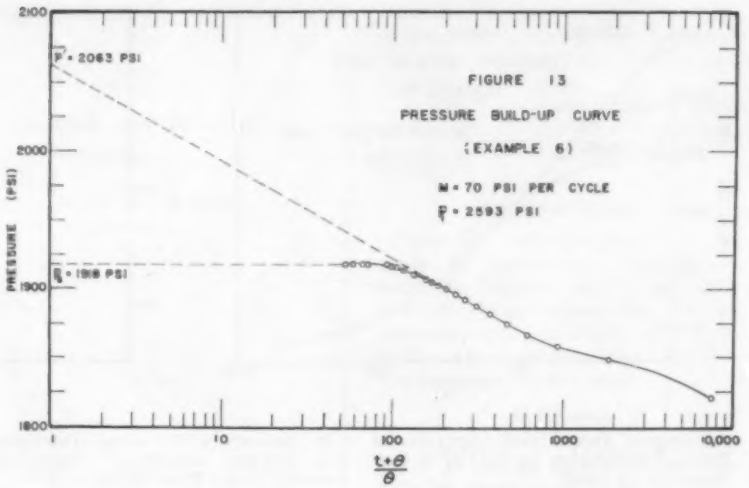


FIGURE 13

PRESSURE BUILD-UP CURVE

(EXAMPLE 6)

M = 70 PSI PER CYCLE

P* = 2593 PSI

$$= 5{,}880 - 70.6\,(1.218)$$

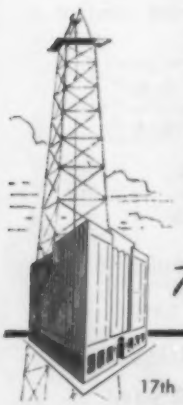
$$\times\,(1/0.268 + 0.38)$$

$$= 5{,}880 - 86.2\,(3.73 + 0.38)$$

$$= 5{,}880 - 86.2\,(4.111)$$

$$= 5{,}880 - 354 = 5{,}526 \text{ psi. by modified Horner method}$$

Using Fig. 7, the actual value of the correction was found to be 33 psi. for a slope of 198 psi. per cycle and $T = 1/4\,u_1 = 1/4\,(0.268) = 0.93$ or approximately 1.00. The difference between p_s using the Horner method and p_s using the modified Horner method is 5,559-5,526 or 33 psi., which is the same as the correction obtained from Fig. 7.



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BOOKS

MATERIALS-HANDLING APPLICATIONS. By D. Oliphant Haynes. Published by Chilton Co., Fifty-sixth and Chestnut Streets, Philadelphia 39. 381 pp. $12.50.

Here is a study of the varied and intricate questions involved in the materials-handling problem: How it should be performed and what equipment should be used to secure the desired results.

Methods and equipment are considered for what they are. The author analyzes various types of containers and handling techniques. He acknowledges that physical characteristics are controlling factors to the all-important function of adapting to the work area.

The engineer is shown how to prepare for a survey, make it, and then evaluate the results.

Among the things dealt with in the book are the following: the basic factors to be integrated; handling functions defined; equipment classified by functions; characteristics of solids; medium-sized boxes and crates; barrels, kegs, drums, and pails.

He also deals with paper shipping sacks and textile bags; bales; glassware; cans; miscellaneous interior containers; small rigid and fragile articles; thin, flat articles, and articles of many other sizes and shapes.

"PRODUCING OIL FIELDS IN KANSAS." Published by Petroleum Statistical Guide, 202 Midco Bldg., Tulsa, Okla. $5.

The Petroleum Statistical Guide has published a set of maps covering the oil fields of Kansas. The maps are based upon the official nomenclature designations for the various pools.

The scale of the maps is 1/10 of an inch to the mile. In addition to the oil fields, the maps show the main highways and towns.

PIPELINE replaces coastal tanker transportation to Oleum. Fig. 1.

Union goes automatic

on its new Junction-Oleum project. Line completely changed company's method of transporting raw materials to refinery

BY SAM D. TABER AND LEONARD B. JONES
Union Oil Co. of California

SEVERAL INTERESTING design features have been incorporated into its recently completed California pipeline by Union Oil Co. of California.

The 12 and 16-in. line is 225 miles long and was installed to deliver various crudes and semirefined products from producing areas in the San Joaquin Valley and coastal area of Central California to Union's Oleum refinery in the San Francisco Bay area. Three pump stations are used to power the system.

A new booster station at Patterson is operated remotely and unattended, and is controlled by the master station at Coalinga, 100 miles to the south. Interfaces are followed through the system by means of capacitance product analyzers. Automatic sampling and tank-switching facilities are provided at the refinery delivery station. Communication, telemetering, and supervisory control are over a company-owned microwave system.

Line Operation

The new line (see Fig. 1) completely changed Union's method of transporting its raw materials to the Oleum refinery. San Joaquin valley crudes formerly were pumped westward from the Junction station to a tanker-loading terminal at Avila. These crudes, together with Orcutt crude and gas oil and pressure distillate from Union's Santa Maria coking plant, were transported to Oleum by tanker.

The new system uses two existing 8-in. lines to deliver waxy crude and San Joaquin heavy crude to Junction pump station. An existing 8-in. line from Junction westward to the coast was reversed to allow shipment of Orcutt crude, gas oil, and pressure distillate from the coastal area to Junction. Forty-five miles of 12-in. line connect Junction to Coalinga pump station and tank farm where additional waxy crude is taken into the system.

Approximately 180 miles of 16-in. line with an unattended booster station at Patterson connect Coalinga to Oleum. The line is designed for 1,000-psi. maximum discharge pressure at any station and has a throughput of approximately 40,000 bbl. daily with Junction pumping directly to Oleum.

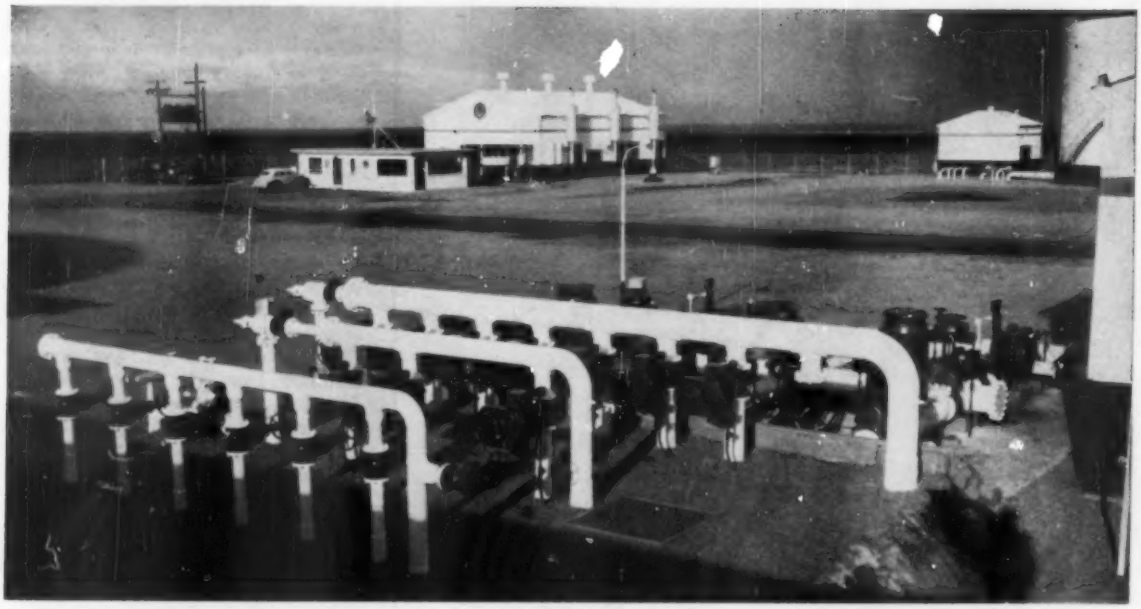
Rates of approximately 60,000 bbl. daily are obtainable with Coalinga on the line pumping to Oleum. Throughput of approximately 90,000 bbl. daily is obtainable from Coalinga to Oleum, with Patterson booster station operating at maximum pressure. Two additional booster stations will increase the capacity of the Coalinga-Oleum system to approximately 120,000 bbl. daily.

Five basically different commodities are transported through the system. These five materials are:

1. **San Joaquin waxy** crude from which lube stocks are manufactured.
2. **Orcutt enriched** crude used to manufacture special asphalts.
3. **San Joaquin heavy** crude, used as feed for a delayed-coking unit.
4. **Santa Maria coker gas oil** used as feed for a thermal cracking unit.
5. **Pressure distillate** from the Santa Maria coking plant which serves as feed to a Unifining-Platforming unit.

This wide range of products handled through the same line presented many problems in design and operation. Two commodities, Orcutt crude and San Joaquin heavy crude (SJH), are high-viscosity materials and cannot be moved through the pipeline cold in their natural state. This problem was solved by diluting the Orcutt crude with natural gasoline and blending the (SJH) witht light waxy crude to lower its viscosity.

A sweet gasoline is produced from the waxy crude; therefore, it must be



COALINGA STATION is master controlling station for Patterson booster. Fig. 2.

buffered from pressure distillate which is mercaptan bearing. Gas-oil shipments must be protected from contamination by pressure distillate to maintain a high flash point, and further protected from asphaltic Orcutt crude which will cause abnormal coking in the thermal cracking unit.

A blend of San Joaquin heavy crude and light waxy crude is used for "buffers" between batches for control of batch contamination. Interface detecting instruments of the capacitance-analyzer type are installed at each of the three stations and at the Oleum receiving facilities as a further aid in minimizing contamination.

Pump Stations and System Equipment

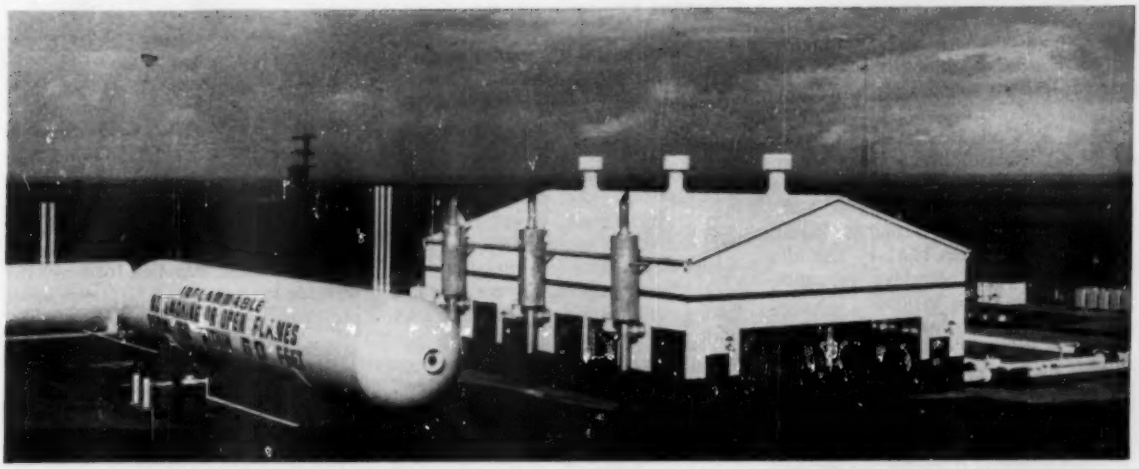
Additions were made to the existing Junction station, and two new stations were built. All main-line pumps are driven by internal-combustion engines operating on natural gas or dual-fuel. All stations are automatically controlled and supervised from local central control boards, with the exception of Patterson which operates remotely and unattended. Coalinga station (see Fig. 2) serves as the master controlling station for the remote operation.

Patterson Booster Station

Remote control at Patterson, including starting and stopping of pumping units, is accomplished with Control Corp. supervisory equipment over a company-owned microwave system.

Pumping equipment consists of three internal-combustion engines driving centrifugal pumps through speed increasers. The engines are natural-gas-burning, naturally aspirated, rated 765 hp. at 525 r.p.m. and 85 b.m.e.p. Compression ratio of the engines is 10.9:1. Fuel consumption at 800 b.hp., 550 r.p.m., and 85 b.m.e.p was shop tested to be 7,480 B.t.u. per b.hp.-hr.

CONTROL of unattended Patterson station is accomplished from Coalinga control room by means of supervisory equipment via microwave. Fig. 3.



PATTERSON UNATTENDED STATION engines burn natural gas with propane for standby. Fig. 4.

Three 10 by 10 by 13½ two-stage centrifugal pumps are operated at various speeds as high as 3,600 r.p.m. The speed increasers have a 6.74 : 1 gear ratio. Two pumps are normally operated in series with a third standby.

The station operates on a closed system, pumping what it receives. Primary station control is by a suction-discharge pressure control valve which positions itself to hold station suction pressure above a certain pre-set minimum pressure and discharge pressure at or below a pre-set maximum pressure.

Rapid changes in station operating conditions are controlled by the control valve, with engines and pumps changing speed only slightly during the change. Engine speed is varied at a slow rate to keep the suction-discharge control valve in its open position. This is accomplished by feeding the controlled air pressure from the suction-discharge pressure controller to an engine-speed controller.

Each engine has its own individual cooling system. Jacket-water cooling is accomplished by means of high-pressure shell-and-tube crude-oil exchangers in the suction lines to each pump. The cooled jacket water from the crude-oil exchanger is utilized for cooling the speed-increaser gear oil and engine lube oil. Jacket-water outlet temperature is maintained at 150° F. by a three-way valve which bypasses the cooling water around the heater exchanger. Individual lube-oil and jacket-water pumps are mounted on each engine.

Supervisory control equipment utilizes a series of different audio-frequency tone pulses to perform various operations. The signal sequence is a group of 0.4-second audio-frequency pulses separated by a time interval of 0-1 second. Each signal sequence is sent out from the controlling station at Coalinga by operating a key switch. Received at Patterson, it is used to select an interposing relay which closes the circuit to perform the selected operation.

After each operation has been performed, the supervisory control checks all of the functions at the controlled station. If the position of any key switches is not in agreement with the panel light, a disagreement horn is sounded at the controlling station. A similar procedure is followed if any function at the controlled station changes position without being selected.

Supervisory control equipment has been provided to perform the following operations at Patterson from Coalinga:

1. Control and operation of station suction and discharge motor-operated valves.
2. Control and indication of sump pump.
3. Control and indication of three engines.
4. Indication of 34 alarms.

Coalinga dispatching equipment is provided with an external buzzer which sounds the alarm for the following:

1. Operation of any equipment at Patterson.
2. Any alarm condition.
3. Remote circuit failure.
4. Out of step indication of stepping distributors.

Transmitters and receivers are provided for continuous telemetering of cut-point indication, station discharge pressure, and station suction pressure. This information is continuously received at the Coalinga station and indicated on the control panel there. The following information is transmitted to Coalinga from the Oleum receiving terminal: (1) Barrel count of the tender being received, (2) receiving pressure, (3) receiving temperature, and (4) warning that a relief valve in the terminal is functioning.

Remote engine-starting sequence . . . The three engines at Patterson may be started and stopped automatically from three locations: (1) Local engine push-button stations, (2) Patterson control-room graphic panel, and (3) the Coalinga graphic panel (see Fig. 3). Pressing the engine start push button at any of the three locations starts the following sequence of events:

1. A start relay causes the motor-operated pump suction and discharge valves to begin opening, and starts the engine prelube pump.

2. After approximately 1½ minutes, the suction and discharge valves are fully open. Limit switches in both valves then close to complete a circuit to a timer motor of the engine start-up sequence controller.

3. The timer opens the engine-starting air inlet for 10 seconds, and energizes the choke and spark retard solenoids for 30 seconds. At the end of the first 10 seconds, the starting air is cut out, the fuel-gas solenoid is opened, and the ignition pulse generator is energized for 20 seconds.

This cycle is repeated five times in the event the engine does not start on the first attempt. At the end of the fifth attempt, the timer is stopped. An electrical counter then closes the start failure circuit, stopping the prelube pump and energizing a console alarm.

Automatic Control

4. When the engine starts, a speed-sensitive switch set above cranking speed, but below idling speed, locks out the timer motor and lights a flashing idle light on the control boards.

5. A lube-oil switch set to break at 30 psi. shuts off the prelube pump.

6. A jacket-water temperature switch, set to make contact at 120° F., bypasses the idle flasher when the jacket water reaches 120° F. The idle light then burns steadily, indicating the engine is ready to load.

7. Pressing the load push buttton opens a solenoid valve in the discharge-suction pressure controller air to the engine governor, placing the unit on the line and allowing the engine governor to set the speed according to the signal from the station suction-discharge pressure controller.

8. When the engine is stopped for any reason other than a start fail, the timer returns to its home or starting position.

Shutdown and alarm system . . . An extensive emergency shutdown and alarm system is provided to protect the station equipment. Each pumping unit has 17 associated alarm lights on an auunciator panel at Patterson.

The following operating conditions at Patterson will sound a buzzer and illuminate a light on the annunciator panels at Patterson and Coalinga:

Jacket water—high temperature.
Engine lube oil—low pressure.
Engine cylinder—misfire.
Engine overspeed.
Engine start failure.
Control-circuit low voltage.
Control console of engine key switch off.
High and low-speed gear bearings—high temperature (four separate alarms).
Pump bearings — high temperature (two separate alarms).
Pump case—high temperature.
Pump seal—failure.
Pump vibration.
Pump suction—low pressure.

Of the 17 above alarms, the following will shut down an engine by closing the fuel-gas solenoid and grounding the ignition pulse generator: high jacket-water temperature, low lube-oil pressure, engine overspeed, high bearing temperatures in the pump or gears, high pump-case temperatures, failure of a pump seal, pump vibration, and low pump-suction pressures.

In addition to the individual pumping-unit alarms and shutdown functions, the following operating conditions will illuminate a light and sound a buzzer at both stations:

Fuel gas—low pressure.
Fuel gas k.o. drum—high level.
Starting air—low pressure.
Sump high level.
Scraper passing through station.
Station suction—low pressure.
Station discharge—high pressure.
Pump discharge—high pressure.
Fog system operating.
Fog system open circuit.
Fog system—d.c. power failure.
Fog system—a.c. power failure.
Jacket-water surge tank—low level.
Instrument air—low pressure.

Of the aforegoing alarms, the following will shut down the Patterson station by grounding the pulse generators and cutting off the fuel gas to the three engines: sump high level, low station suction and high discharge pressures, high pump discharge pressure, and the fog system operating.

Fuel-gas system . . . The three engines at Patterson normally use natural gas for fuel. In the event of natural-gas curtailment, a 72-hour supply of propane is provided. The propane system consists of a 22,300-gal. liquid propane storage tank, a vaporizer and dilution unit, and a 1,000-cu.-ft. mixed-gas receiver (see Fig. 4).

A control-valve arrangement automatically switches the station to propane if the natural gas pressure drops to 5 psi. Also, the station may be switched to propane remotely from Coalinga by actuating a solenoid valve in the fuel-gas control-valve system.

Line-scraper operation . . . Scraper detection signals are located approximately 500 ft. upstream and immediately downstream of the main-line check valve. As the scraper reaches the first signal, solenoid valves are actuated in control air lines to the engine governors and station suction-discharge control valve.

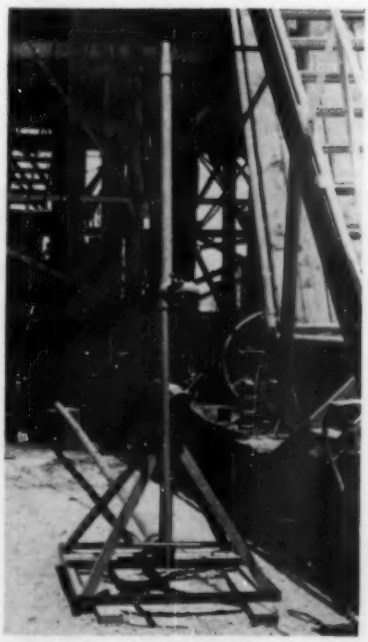
This reduces the engines to idle speed and closes the suction-discharge pressure control valve until the scraper has passed the second signal point. When the scraper reaches the second signal point, which is located downstream from the station check valve, the station automatically resumes operation.

Fire-protection system . . . The remote location and unattended operation of Patterson station prompted Union to install an elaborate fire-protection system. A fog system protects the equipment inside the main pump house, and "figure-8" hose stations are strategically located to protect other equipment and buildings. In the event of a fire in the pump room, the fog-system pump engine is automatically started by a control system which is actuated by temperature-sensitive elements.

The motor-driven figure-8 fire pump is started by a flow switch. Standby battery power operates the fog-pump control system in case of a power failure. Alarms are actuated locally at Patterson and remotely at the controlling station at Coalinga if either the fog or figure-8 system is in operation, or if a power failure occurs in the fog-system control circuit. A 5,000-bbl. water tank, supplied from a water well, and a separate fire pump house are provided.

Station Buildings

A 40 by 21-ft. concrete block building was constructed for office space, electrical-control equipment, supervisory-control equipment, etc. The main pump house, 66 by 40 ft., is constructed of steel frame with corrugated steel siding. Pumps and engines are in the same room. A 16 by 12-ft. corrugated-steel building houses the fire and utility water pumps.



Mud-pit jets can put out fires

HERE is a new use for mud pit jets. Phillips Petroleum Co. has this handy in case of fire on the rig floor.

The well, P.P.C. 1E-E uses mud under extremely high pressure. In the event of fire, the nozzle is directed on to the rig floor and the mud from the pumps becomes foam, an excellent firefighting tool that instantly smothers the blaze.

Monthly Report on PIPELINE CONSTRUCTION

WHO • WHAT • WHERE • WHEN • HOW LONG

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups—U. S., Canadian, and Foreign—and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.

Project: Line from lower Delaware Bay to Philadelphia.

Status: Planned.

Completion: 1960.

• **Gillette Pipeline, Inc.**, and **A. W. Hartwig, Inc.**

Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.

Status: Pending Wyoming Public Service Commission approval.

• **Great Northern Railway Co.**

Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and N. D., to Clearbrook or St. Paul, Minn.

Contractor: **Pipe Line Technologists, Inc.**, Houston, has completed feasibility study.

• **International Oil Pipeline Corp.**, New York City.

Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).

Status: Pending Canadian Board of Transport Commission approval.

• **International Refineries, Inc.**, Minneapolis, and **Northwestern Refining Co.**, St. Paul Park, Minn.

Project: Gathering lines in Newburg pool in Bottineau County, North Dakota.

Status: Have applied to N. D. Public Service Commission for approval.

• **Interstate Oil Pipe Line Co.**, Shreveport, La.

Project: 35 miles of main line plus gathering lines in the Brookhaven District in Miss. Main line will run from Raleigh, Martinville, and Magee fields and will connect to company's system just east of Gwinville.

Status: Under way.

Completion: Early December 1958.

• **Shell Pipe Line Corp.**, Houston.

Project: 13 miles of 8-in., 11 miles of 12-in., 31 miles of 16-in., and 65 miles of 20-in. from Mississippi River Delta area to New Orleans refining area.

Status: Work to start October 1958.

Contractor: **Coates Field Service, Inc.**, Oklahoma City, has right-of-way acquisition and claims settlement. **Houston Contracting Co.**, Houston, has the 20-in. to complete December 1958.

Completion: February 1959.

Project: 43 miles of 8-in. main line and 20 miles of 4, 6-in. gathering line to extend facilities from Colorado City, Tex., to the Borden-Garza county area of West Texas.

Status: Under way.

Completion: December 1, 1958.

• **Sinclair Pipe Line Co.**, Independence, Kans.

Project: 140 miles of 8-in. and 140 miles of 12-in. takeup and reconditioning between Teague and Huffman, Tex.

Status: Under way.

Contractor: **Trojan Construction Co.**, Oklahoma City, W. B. Winfrey, spreadman.

Completion: Fall 1958.

• **Union Oil Co. of California**, Los Angeles.

Project: 2 miles of 30-in. from proposed outer harbor terminal to Los Angeles outer harbor wharf, and 6 miles of 12-in. crude and bunker fuel line from proposed outer harbor terminal to Union's Los Angeles refinery.

Status: Planned.

Completion: February 1959.

U. S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**, Edmonton, Alta.

Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage, Alaska.

Status: Proposed.

Completion: 1959.

• **Columbia Gas System, Inc.**, New York City.

Project: 37 miles of 6-in. from Kenova, W. Va., to Siloam, Ky.

Status: Planned.

Completion: December 1, 1958.

• **Everglades Pipe Line Co.**, Miami, Fla.

Project: 35 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport.

Status: Engineering study under way.

Completion: Late 1958.

• **Katy and New York Central Railroads.**

Project: 2,500 miles of 10-in. and smaller LPG line from Houston through Kansas City, St. Louis, Indianapolis, and Cleveland to Syracuse, then down to New York City. A branch would go through Chicago to Detroit.

Status: Planned. May start before fall 1958.

Contractor: **Williams Brothers Co.**, Tulsa, has completed feasibility study.

Completion: November 1, 1959.

• **Standard Oil Co. (Ind.)**, Chicago.

Project: 23 miles of 8-in. in the Chicago area.

Status: Planned.

Completion: Mid-1959.

• **Texas Eastern Transmission Corp.**, Little Big Inch Div., Shreveport, La.

Project: 10 miles of 8-in. LPG line from Lebanon to Todhunter underground storage in O., and 62 miles of 8-in. from Tyler to Carthage, Tex.

Status: Planned.

• **Underground Storage & Exploration, Inc.**, Upper Darby, Pa.

Project: 393 miles of 12-in. LPG line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.

Status: Proposed.

• **Union Oil Co. of California**, Los Angeles.

Project: 2 miles of 12-in. bunker fuel line from proposed outer harbor wharf to Los Angeles outer harbor wharf, and 6 miles of 12-in. crude and bunker fuel line from proposed outer harbor terminal to Union's Los Angeles refinery.

Status: Planned.

Completion: February 1959.

• **Wabash Pipe Line Co.** (Ohio Oil Co., Continental Oil Co.), Findlay, O.

Project: 265 miles of 12-in. from Hartford, Ill., to Griffith, Ind.

Status: Under way.

Contractor: **Contract & Materials Co.**, Evanston, Ill.

Completion: November 1, 1958.

U. S. Natural-Gas Pipelines

• **American Louisiana Pipe Line Co.**, Detroit.

Project: 28 miles of 12-in. Big Lake, La., gathering lines.

Status: Pending FPC approval.

• **Arkansas Louisiana Gas Co.**, Shreveport, La.

Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.

Status: Proposed.

Project: A 40-mile line to serve Lake Catherine and Lake Hamilton near Hot Springs, Ark.

Status: Under way.

Completion: December 1958.

• **Atlantic Seaboard Corp.**, Charleston, W. Va.

Project: 12 miles of 26-in. in Hardy County, West Virginia, and 6 miles of 26-in. in Shenandoah County, Virginia.

Status: Has temporary FPC approval.

• **Capital Gas Pipe Line Co.**, Dallas.

Project: 120 miles of 12, 14-in. main line and 250 miles of 2 to 10-in. gathering lines in Hamilton, Eastland, Erath, Stephens, Palo Pinto, Parker, Coleman, Brown, and Comanche counties, Texas.

Status: Under way.

Contractor: **N. A. Saigh Co., Inc.**, San Antonio, Tex.

Completion: January 1, 1959.

• **Carnegie Natural Gas Co.**, Pittsburgh.

Project: Two parallel lines between Clairton and Homestead, Pa., to provide coke-oven gas to six Pittsburgh-area plants: 9 miles of 55-in. and 4 miles of 43-in. each.

Status: Under way.

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PIPELINE CONSTRUCTION

Contractor: **Williams Brothers Co.**, Tulsa.
Completion: January 1, 1959.

• **Cascade Natural Gas Corp.**
Project: 17 miles of 8-in. between Pasco and Attalia, Wash.
Status: Under way.
Contractor: **Mid-Continent Contractors, Inc.**

• **Central Hudson Gas & Electric Corp.**, Poughkeepsie, N. Y.
Project: 2 miles of 10-in. from T-P Line Tap Point to Danskammer Steam Station and 5 miles of 8-in. from Temple Hill Tap to Newburgh, N. Y.
Completion: November 1958.

• **Chicago District Pipeline Co.**, Chicago.
Project: 52 miles of 30, 36-in. between Joliet and Chicago.
Status: Approved by FPC examiner.
Completion: 1958.

• **Coastal States Gas Producing Co.** and **Southern Coast Corp.**, Corpus Christi, Tex.
Project: 45 miles of 2 to 10-in. in Bee County, Texas, to connect presently shut-in fields with Texas Eastern Transmission Corp.'s system.
Status: Planned.

• **Coastal Transmission Corp.**, Houston.
Project: 94 miles of 12-in. from McAllen to Robstown, Tex.; 147 miles of 20-in. from Robstown to Bay City, Tex.; 68 miles of 22-in. from Bay City to Galveston Bay, Tex.; 252 miles of 24-in. from Galveston Bay to Baton Rouge, La.
Status: Approved. Survey and right-of-way work under way.
Completion: April 1959.
Project: 320 miles of 3 to 14-in. gathering lines at various locations on Texas and Louisiana Gulf Coast.
Status: Approved.
Completion: April 1959.

• **Colorado Interstate Gas Co.**, Colorado Springs, Colo.
Project: 109 miles of 26-in. from Four-Way station in Texas Panhandle, to Morton Junctions in southeastern Colorado; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to California.
Status: Planned.
Completion: January 1, 1960.

• **Consumers Power Co.**, Jackson, Mich.
Project: 45 miles of 24-in. from Woodbury station to Laingsburg Junction, Mich.
Status: Planned.
Completion: 1959.
Project: 120 miles of 26-in. from Michigan-Indiana border connection with Trunkline Gas Co., to Plymouth, Mich.
Status: Planned.
Completion: Fall 1959.

• **Eastern Shore Natural Gas Co.**
Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinental Gas Pipe Line Corp., in Maryland, across Delaware to Salisbury.
Status: Under way.
Contractor: **Buchanan Pipe Line Construction Co.**, Birmingham, Ala.
Completion: November 1958.

• **El Paso Natural Gas Co.**, El Paso, Tex.
Project: 13 miles of 20-in. and 63 miles of 16-in. Aneth line; 102 miles of field lines.
Status: Approved.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex., has main line. **Engineers Limited Pipeline Co.** has the field lines.
Completion: October 1958.
Project: 177 miles of 20-in. from Sonora plant, Sutton County, to Plains plant, Yoakum County, Texas.
Status: Under way.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex., and **McVean & Barlow, Inc.**, Odessa, Tex.
Completion: October 1958.
Project: 79 miles of 10-in. from Quartzsite to Yuma, Ariz.
Status: Under way.
Contractor: **Eastern Pipeline Constructors**, Dallas, John Griffith, supt., spread offices at Quartzsite and Yuma.
Completion: December 1, 1958.
Project: 400 miles of 34-in. from Salt Lake City, to California border near Las Vegas, Nev.
Status: Planned.
Completion: September 1, 1959.
Project: 1,000 miles of main line loop from Plains, Tex., to California border.
Status: Planned.
Completion: 1960.

• **Gulf Interstate Gas Co.**, Houston.
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various-size field lines in Acadia and Vermilion parishes, Louisiana.
Status: Approved.
Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish.
Status: Has temporary FPC approval.
Project: 352 miles of 30-in. loop between Louisiana and Leach, Ky.; 54 miles of 24-in. lateral in Louisiana.
Status: Under way.
Contractor: **Houston Contracting Co.**, Houston, has 216 miles of 30-in.: 110 miles beginning near Inverness, Miss., A. J. Slovack, superintendent, office at Greenwood, Miss.; 106 miles beginning near Jena, La., L. A. Young, superintendent, office at Jena. Houston also has the 24-in. **H. C. Price Co.**, Bartlesville, Okla., has 132 miles in Kentucky and Tennessee, R. L. Ezell, superintendent, office at Stanford, Ky., and C. R. Ice, superintendent, office at Tompkinsville, Ky.
Completion: November 1, 1958.

• **Gulf Resources, Inc.**, Dallas.
Project: 125-mile line from Lopeno field in Zapata County to a point in LaSalle County, Texas.
Status: Proposed.

• **Houston Texas Gas & Oil Corp.**, St. Petersburg, Fla.
Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sales laterals in Florida. Main line will join Coastal Transmission's line from McAllen, Tex., to Baton Rouge, La.
Status: Right-of-way procurement under way.
Contractor: **Midwestern Constructors, Inc.**, Tulsa, has the 702 miles of 24-in. **Harbert Construction Corp.**, Birmingham, has remainder.
Completion: 1959.

• **Humble Oil & Refining Co.**, Houston.
Project: 250 miles of 26 or 30-in. from Southwest Texas to Houston.
Status: Planned.
Completion: 1960.
Project: 67 miles of 30-in. between Clear Lake and Lovell Lake Junction, Tex., and 24-in. from there to Port Arthur, Tex.
Status: Under way.
Contractor: **Sharman, Allen, Gay & Taylor**, Houston, has completed 39 miles from Hankamer to Port Arthur. **Panama-Williams Corp.**, Houston, has 39 miles from Clear Lake to Hankamer. **Gulf Welding & Machine Works**, Conroe, Tex., has the Houston Ship Channel crossing.
Completion: Fall 1958.
Project: 37 miles of 24-in. and 47 miles of 12-in. gathering lines in Falfurrias area of Southwest Texas.

PIPELINE CONSTRUCTION

Status: Under way.
Contractor: **H. B. Zachry Co.**, San Antonio, Tex., has the 24-in. **H. S. Shanks & Sons,** Alice, Tex., has the 12-in.
Completion: Fall 1958.

- **Iron Ranges Natural Gas Co.**, St. Paul.

Project: 70 miles of 6 to 16-in. in Mesabi Iron Range area.
Status: Pending FPC approval.
Completion: 1959.
Project: 63 miles of 12-in. between Duluth and Silver Bay, Minn.
Status: Pending FPC approval.
Completion: 1959.

- **Kansas-Nebraska Natural Gas Co., Inc.**, Hastings, Neb.

Project: 23 miles of 6-in. from Atwood to Akron, Colo.
Status: Planned.
Contractor: **Brodie Construction Co.**, Amarillo, Tex.
Completion: December 1, 195[illegible]

- **Magnolia Petroleum Co.**, D[illegible]las.

Project: 22 miles of 16-in. offshore, Louisiana.
Status: Under way.
Contractor: **Brown & Root, Inc.**, Houston.
Completion: Fall 1958.

- **Manufacturers Light & Heat Co.**, Pittsburgh.

Project: 9 miles of 8-in. from Steubenville to Wintersville, Ohio.
Status: Planned.
Completion: December 1958.
Project: 9 miles of 8-in. from Berlin to Somerset, Pa.
Status: Planned.
Completion: January 1959.
Project: 34 miles of 20-in. in Greene, Adams, and York counties, Pennsylvania.
Status: Has temporary FPC approval.
Completion: Before end 1958.

- **Michigan Consolidated Gas Co.**, Detroit.

Project: 67 miles of 10, 12-in. between Sears and Traverse City, Mich.
Status: Under way.
Contractor: **Somerville Construction,** Ada, Mich., Floyd Huduall, superintendent, office at Cadillac, Mich.
Project: 60 miles of 10, 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.**, Ada, Mich., jointly with **H. L. Gentry Construction Co.**, Jackson, Mich., Frank Morris, superintendent, office at Hart, Mich.

- **Michigan Wisconsin Pipe Line Co.**, Detroit.

Project: 13 miles of 8-in. loop near Fort Madison, Iowa, and 25 miles of 12-in. near Madison, Wis.
Status: Work started September 15, 1958.
Contractor: **G. E. T. Construction, Inc.**, Milwaukee, Dewey Moore, spread man on Madison loop; Emmett Hunter, spread man on Iowa loop.

- **Mississippi River Fuel Corp.**, St. Louis.

Project: 38 miles of 26-in. loop between Bald Knob, Ark., and Perryville, La.
Status: Pending FPC approval.
Completion: December 1958.

- **Natural Gas Pipeline Co. of America**, Chicago.

Project: 232 miles of 36-in. between Beatrice, Neb., and Joliet, Ill., and 258 miles of 36-in. and 21 miles of 26-in. between Texas Panhandle and Beatrice.
Status: Has temporary FPC approval. Under way.
Contractor: **R. H. Fulton & Co.**, Lubbock, Tex., has 21 miles of 26-in. and 102 miles of 36-in. between Fritch and Kans. line, and 105 miles of 36-in. in Kans. **Williams Brothers Co.**, Tulsa, has 106 miles of 36-in. in Kans. and Neb., terminating near Emerson, Iowa, and 99 miles of 36-in. from there to Harper, Iowa. **Contracting Materials Co.**, Chicago, has 82 miles of 36-in. from Harper, Iowa, to Joliet, Ill.
Completion: January 1, 1959.

- **New York State Natural Gas Corp.**, Pittsburgh.

Project: 30 miles of 20-in. from Castile to Elma, N. Y.
Status: Pending FPC approval.
Contractor: **Joyce Pipe Line Co.**, Andover, N. Y.
Completion: October 10, 1958.
Project: 4 miles of 6-in., 2 miles of 8-in., 1 mile of 10-in., and 13 miles of 12-in., storage lines in Leidy and Stewardson townships, Pennsylvania.
Status: Pending FPC approval.
Contractor: **Harford Brothers,** Emporium, Pa.

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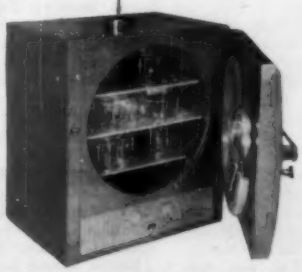

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PIPELINE CONSTRUCTION

Completion: November 1, 1958.

• **North Carolina Natural Gas Corp.,** Fayetteville, N. C.

Project: 730 miles of 2 to 16-in. from near Mooresville, eastwardly across North Carolina.

Status: Under way.

Completion: Late 1958.

• **Northern Illinois Gas Co.**

Project: 140 miles of 24-in. from Des Plaines to East Dubuque, Ill.

Status: Pending FPC approval.

Contractor: **Williams Brothers Co.,** Tulsa, has preliminary engineering and right-of-way studies under way.

Completion: November 1, 1958.

• **Northern Natural Gas Co.,** Omaha, Neb.

Project: 18 miles of 20-in. from Dubuque, Iowa, to Menominee, Ill.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 19 miles of 30-in. from S. Sioux City to Oakland, Neb.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 9 miles of 30-in. from Palmyra to Beatrice, Neb.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 11 miles of 30-in. from Clifton to Tescott, Kans.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 8 miles of 30-in. from Tescott to Bushton, Kans.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 11 miles of 30-in. from Sunray, Tex., to Beaver, Okla.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 8 miles of 30-in. and 44 miles of 16-in. from Beaver, Okla., to Mullinville, Kans.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 169 miles of 20-in. from Farmington, Minn., to Superior, Wis.

Status: Pending FPC approval.

Project: 23 miles of 24-in. main line loop in Nebraska.

Status: Pending FPC approval.

Project: 43 miles of 20-in. main line loop in Kansas, Nebraska, and Louisiana.

Status: Pending FPC approval.

Project: 44 miles of 16-in. in Duluth-Superior, Wis., area.

Status: Pending FPC approval.

Project: 1,100 miles of 26-in. from Montana border to Minneapolis. (See Northern Natural Gas Co. in Canadian Natural Gas Pipeline section.)

Status: Planned.

Project: 1,090 miles of 2 to 16-in. branch lines in Minnesota, Louisiana, South Dakota, Nebraska, and Wisconsin.

Status: Pending FPC approval.

Project: 57 miles of 30-in. main line loop in Nebraska and Kansas.

Status: Pending FPC approval.

• **Northern Utilities Co.,** Casper, Wyo.

Project: 35 miles of 16-in. in Fremont-Natrona counties, Wyoming; 8 miles of 12-in. near Casper, Wyo.; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field, Wyoming; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander, Wyo., area.

Status: Planned.

• **Offshore Gathering Corp.,** Houston.

Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. dual line.

Status: Pending FPC approval.

• **Ohio Fuel Gas Co.,** Columbus.

Project: 10 miles of 8-in. from Line O-1463 to near St. Clairsville, Ohio.

Status: Approved.

Completion: October 5, 1958.

Project: 4 miles of 20-in. from Line A-97 to near Dayton.

Status: Approved.

Completion: October 2, 1958.

• **Oklahoma Missouri Gas Transmission Co.,** Oklahoma City.

Project: 500 miles of 24-in. from Central Oklahoma to St. Louis.

Status: Proposed.

• **Pacific Lighting Gas Supply Co.,** Los Angeles.

Project: 128 miles of 34-in. from Topock to Newberry, Calif.

Status: Filed April 1958 for California Public Utilities Commission approval.

Completion: November 1, 1958.

• **Pacific Northwest Pipeline Corp.,** Salt Lake City.

Project: 40-mile line from Ute Trail fields in northeastern Utah, to its main line in western Colorado.

Status: Under way.

Project: 51 miles of 30-in. from main line to Big Piney field, Wyoming, looping present 16-in. lateral.

Status: Under way.

Contractor: **R. H. Fulton & Co.,** Lubbock, Tex.

Completion: November 1, 1958.

• **Panhandle Eastern Pipe Line Co.,** Kansas City, Mo.

Project: 68 miles of 4-in., 37 miles of 6-in., 35 miles of 8-in., and 12 miles of 12-in. gathering lines in Kansas, Oklahoma, and Texas.

Status: Under way.

Contractor: **B. C. Hall Constructors, Inc.,** Aztec, N. M.

Completion: December 31, 1958.

• **Pennsylvania Gas Co.,** Warren, Pa.

Project: 23 miles of 10-in. in Erie County, Pennsylvania, 15 miles of 8-in. in Warren and Chautauqua counties, Pennsylvania, 30 miles of branch lines, and several small distribution lines.

Status: Approved.

• **Permian Basin Pipeline Co.**

Project: 61 miles of 16-in. and 11 miles of field lines in Winkler County, Texas.

Status: Pending FPC approval.

• **Piedmont Gas Co.,** Hickory, N. C.

Project: 78 miles of 2 to 8-in. extension off Transcontinental in North Carolina, to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Approved.

• **Pioneer Gathering System, Inc.,** Amarillo, Tex.

Project: Gathering lines in Texas fields: 7 miles of 4-in. in Buckhorn field; 2 miles of 6-in., 1 mile of 4-in., and 2 miles of 8-in. in Vinegarone field; 2 miles of 3-in. in Mount Ketchum field; 4 miles of 3-in., 1 mile of 2-in., and 16 miles of 4-in. in Tilleny field; 7 miles of 2-in. in Mertyon field.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 62 miles of 10-in. from Pampa to Canyon, Tex., plus 20 miles of small size gathering lines.

Status: Planned.

• **Signal Oil & Gas Co.,** Los Angeles.

Project: Considering expansion of gathering system for its sulfur-extraction plant at Tioga, N. D., into the developing oil area near the Canadian border in Burke County.

• **Southern California Gas Co.,** Los Angeles.

Project: 3 miles of 20-in. Kettleman-Lemoore system in Kings County, California.

Status: Planned.

Completion: October 1958.

Project: 186 miles of 34-in. from Ivanpah Lake to Placentia, Calif.

Status: Proposed.

• **Southern California Gas Co.,** and **Southern Counties Gas Co. of California,** Los Angeles.

Project: 19 miles of 30-in. from near Newhall, Calif., to Burbank Boulevard and Yarmouth Avenue in Los Angeles.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.,** San Francisco.

Completion: November 1, 1958.

• **Southern Counties Gas Co. of California,** Los Angeles.

Project: 20 miles of 24-in. from Temecula, Calif., northward.

Status: Planned.

Completion: November 1, 1958.

• **Southern Natural Gas Co.,** Birmingham, Ala.

Note: Parts of several projects below have been contracted. **Williams Brothers Co.,** Tulsa, has 42 miles of 24-in. from Lake Pontchartrain to Franklinton, La. **River Construction Corp.,** Fort Worth, has 67 miles of 26-in. from Franklin to Sarotoga, Miss., Vernon Gaynart, supt., office at Columbia, Miss., and 56 miles of 24-in. from Sarotoga to Montrose, Miss., D. C. White, supt., office at Magee, Miss., to complete October 31, 1958. **Houston Contracting Co.,** Houston, and **H. C. Price Co.,** Bartlesville, have 166 miles of 24-in., and 47 miles of 20-in. on South Line. **Latex Construction Co.,** Atlanta, has 22 miles of 14-in. from Bell Mills, Ala., to Cedartown, La., to complete October 1, 1958, and 41 miles of 14-in. from Macon, Ga., to Griffin, La., to complete November 15, 1958, O. P. Hiner, supt., office at Forsyth, La. **Ford, Bacon & Davis, Inc.,** New York City, has 18 miles of 8-in. on LaGrange, Ga., and Calera, Ala., lines, 5 miles of 12-in. at Amory, Miss., 8 miles of 20-in. between Gwinville and Pickens Miss., and 12 miles of 6-in. on Vicksburg line. **Western Pipeline, Inc.,** Austin, Tex., has 29 miles of 24-in. main line loop, 46 miles of 20-in., 14 miles of 16-in., 14 miles of 10-in., 23 miles of 8 in., and 7 miles of 6-in. **Brown & Root, Inc.,** Houston, has 16 miles of 20-in., 14 miles of 16-in., 25 miles of 12-in., 2 miles of 8-in., 12 miles of 6-in., and 6 miles of 4-in.

Project: Supply lines in South Louisiana: 9 miles of 16-in. Bayou Long field lateral; 7 miles of 16-in. Little Bayou Pigeon lateral; 4 miles of 6-in. Mystic Bayou field lateral; 2 miles of 6-in. East Bayou Pigeon lateral.

Project: 7 miles of 24-in. from Gwinville to Pickens, Miss.

Project: 13 miles of 10-in. Tantine field lateral in South Louisiana.

Project: 3 miles of 8-in. Dexter field lateral in Mississippi.

Project: Supply lines in South Louisiana: 46 miles of 20-in. from White Castle to South Section 28 field; 7 miles of 10-in. Bayou Boullion field lateral; 11 miles of 8-in. East Happytown field lateral; 8 miles of 10-in. and 11 miles of 8-in. Loisel field lateral; 17 miles of 20-in. Lake Washington field lateral; 22 miles of 12-in. West Delta Block 30 lateral; 4 miles of 8-in. Bayou Long field lateral; 6 miles of 4-in. Bayou Villars field lateral; 12 miles of 6-in. Marrero field lateral; 6 miles of 6-in. South Lake Long field lateral; 1 mile of 4-in. Tigers Ridge field lateral; 35 miles of 16-in. Montegut field lateral; 13 miles of 16-in. Barataria Line loop; 69 miles of 24-in. from Toca to Franklinton.

Status: Above five projects approved and under way.

Completion: 1958-1959.

Project: 67 miles of 24-in. from Gwinville to Enterprise, Miss.; 71 miles of 24-in. from Enterprise to Gallion, Ala.; 83 miles of 24-in. from Gallion to Elmore, Ala.; 43 miles of 20-in. and 46 miles of 24-in. from Elmore to Ellerslie, Ga.; 69 miles of 20-in. from Ellerslie to Ocmulgee, Ga.; 79 miles

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Full details of the technical program, registration forms, applications for hotel accommodations and notes on field trips and social activities being organized in conjunction with the Congress will be mailed to potential registrants in October.

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WORLD PETROLEUM CONGRESS

PIPELINE CONSTRUCTION

of 16-in. from Ocmulgee to Wrens, Ga.; 8 miles of 6-in. Vicksburg, Miss., loop; 5 miles of 12-in. Amory, Miss., loop; 9 miles of 8-in. Calera, Ala., loop; 23 miles of 14-in. Rome, Ga., loop; 9 miles of 8-in. at LaGrange, Ga.; 62 miles of 14-in. from Ocmulgee, Ga., to Atlanta.

Status: Pending FPC approval.

Project: Facilities to attach additional supplies in South Louisiana; 6 miles of 8-in. from Ship Shoals Block 28 to Block 32; 29 miles of 16-in. from Ship Shoals Block 28 to Atchafalaya Bay; 15 miles of 16-in. from north shore Atchafalaya Bay to Patterson; 6 miles of 16-in. from Patterson to Duck Late; 8 miles of 6-in. Bayou Felice lateral; 1 mile of 4-in. Triumph field lateral; 2 miles of 8-in. Coffee Bay field lateral.

Status: Pending FPC approval.

Completion: 1958-1959.

Project: Facilities to attach additional supplies in Mississippi: 8 miles of 8-in. Hub field lateral; 40 miles of 14-in. and 40 miles of 16-in. from Cranfield to Gwinville.

Status: Pending FPC approval.

Completion: 1958-1959.

Project: 2 miles of 4-in. Bayou Postillion lateral.

Status: Pending FPC approval.

- **Tennessee Gas Transmission Co.,** Houston.

Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.; 163 miles of 30-in. and 101 miles of 26-in. from Portland to near Lancaster, Ky., from Winchester, Ky., to Morehead, Ky., from Catlettsburg, Ky., toward Broad Run, W. Va., from New Wilmington, Pa., to Mercer, Pa., and from Morehead to Catlettsburg.

Status: Approved. Under way.

Contractor: **Oklahoma Contracting Co.,** Dallas, has 90 miles from Columbia, Miss., to the Tennessee River, Ed Peters, supt. **Sharman, Allen, Gay & Taylor,** Houston, has completed 28 miles in La., Miss. **Houston Contracting Co.,** Houston, has 37 miles in Plaquemines and St. Bernard parishes, Louisiana, R. E. Thronton and R. L. Silar, superintendents. **Bechtel Corp.,** San Francisco, **Grayco Constructors, Inc.,** Austin, Tex., **Western Pipe Line, Inc.,** Austin, Tex., and **Panama, Inc.,** Houston, have remainder.

Project: 21 miles of 16-in. and 2 miles of 12-in. to offshore Louisiana fields.

Status: Pending FPC approval.

Project: 76 miles of 24-in. from Coudersport, Pa., to Hamburg, N. Y.

Status: Approved.

Contractor: **Williams Brothers Co., Tulsa.**

- **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Mississippi, westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, Louisiana.

Status: Approved.

- **Texas Eastern Penn-Jersey Transmission Corp.**

Project: 12 miles of 30-in. looping in Pennsylvania.

Status: Approved.

Contractor: **H. C. Price Co.,** Bartlesville, Okla.

- **Texas Eastern Transmission Corp.,** Shreveport, La.

Project: 17 miles of 8-in. and 3 miles of 6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.

Status: Approved.

Project: 22 miles of 14-in. from Rayne field to near Opelousas, La.

Status: Approved by FPC examiner.

Completion: November 1958.

Project: 47 miles of 30-in. looping in Kentucky and Ohio.

Status: Under way.

Contractor: **H. C. Price Co.,** Bartlesville, Okla., G. A. Reutzel, superintendent, office at Caldwell, Ohio; W. H. Olrich, superintendent, office at Danville, Ky., to later move to Portsmouth, Ohio.

- **Texas Gas Transmission Corp.,** Owensboro, Ky.

Project: 92 miles of 30-in. looping near Alexandria and Bastrop, La., and near Greenville and Clarksdale, Miss.

Status: Pending FPC approval.

Project: 13 miles of 16-in. looping in Jefferson Davis and Acadia parishes, Louisiana.

Status: Pending FPC approval.

Project: 19 miles of 26-in. looping near Hardinsburg and West Point, Ky.

Status: Pending FPC approval.

Project: 15 miles of 16-in. and smaller looping near Henderson, Ky., Petersburg and Linton, Ind., and Lawrenceville, Ill.

Status: Pending FPC approval.

- **Texas Illinois Natural Gas Pipeline Co.,** Chicago.

Project: 860 miles of 30-in. looping of present system.

Status: Planned.

Completion: 1960-1961.

- **Transcontinental Gas Pipe Line Corp.,** Houston.

Project: 107 miles of 30-in., and 205 miles of 36-in. main line looping in various states.

Status: Under way.

Contractor: **Bechtel Corp.** has 55 miles of 36-in. and 8 miles of 30-in. in New Jersey and Pennsylvania. **Sharman, Allen, Gay & Taylor,** Houston, has 65 miles of 30 and 36-in. loops in La. and Miss., E. D. Singleton, supt. **J. P. Neill & Co.** has 11 miles of 30-in. and 57 miles of 36-in. in N. C. and Va.

Completion: November 1958.

Project: 1 mile of 30-in. and 51 miles of 36-in. main line loops in various states.

Status: Approved by FPC examiner.

Completion: 1959.

Project: 445 miles of 24-in. and smaller purchase laterals in Texas and Louisiana.

Status: Approved by FPC examiner.

Contractor: **H. C. Price Co.,** Bartlesville, has 65 miles in La.

Completion: Last half 1958.

Project: 29 miles of 30-in. and 164 miles of 23-in. from Leidy storage field in Pennsylvania, to its trunk line to New York.

Status: Under way.

Contractors: **Sharman, Allen, Gay & Taylor,** Houston, has 65 miles, J. A. Adams, supt., office at Renova, Pa. **Panama-Williams Corp.,** Houston, has remainder, M. B. Henderson, supt., office at Hughesville, Pa., W. H. Shifflett, supt., office at Wilkes Barre, Pa.

Completion: November 15, 1958.

Project: 52 miles of 10, 14-in. purchase laterals in Texas and Louisiana.

Status: Approved by FPC examiner.

Completion: 1959..

- **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. R. Butler), Dallas.

Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.

Status: Pending FPC approval.

Completion: Mid-1959.

- **Trunkline Gas Co.,** Houston.

Project: 464 miles of 30-in. looping between Longville, La., and Tuscola, Ill.; 44 miles of 24-in. looping in Texas; and 204 miles of 26-in. extension of main line from Tuscola to Vistula, Ind., to connect with Consumers Power Co.

Status: Pending FPC approval.

Completion: Fall 1959.

Project: 24, 26-in. Red River crossing in Rapides Parish, Louisiana.

Status: Under way.

Contractor: **Missouri Valley Dredging Co., Omaha.**

Completion: January 1959.

Project: 143 miles of 12 to 20-in. and 40 miles of 4 to 10-in. purchase laterals.

Status: Planned.

- **United Gas Pipe Line Co.,** Shreveport, La.

Project: 117 miles of 30-in. looping from Southeast Louisiana, to Mobile, Ala.

Status: Approved. Under way.

Project: 15 miles of 12-in. from N. Henderson field to Carthage-Longview main line.

Status: Planned.

Completion: End of 1958.

Project: 9 miles of 16-in. from Belle Isle field offshore Louisiana, to Kosciusko main line.

Status: Planned.

Completion: End of 1958.

Canadian Crude-Oil Pipelines

- **Act Oils, Ltd.**

Project: A 450-mile line from the Peace River region of northern British Columbia to tidewater at Kitimat, B. C.

Status: Pending British Columbia Government approval.

- **B-A Alberta Pipe Line, Ltd.,** Calgary, Alta.

Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.

Status: Pending approval.

- **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)

Project: A 250-mile line from Athabasca oil sands in northeastern Alberta, to Edmonton.

Status: Proposed.

Completion: 1960.

- **Federated Pipe Lines, Ltd.** (subsidiary of Home Oil Co., Ltd.), Calgary.

Project: 130 miles of 10-in. from Swan Hills area to Edmonton.

Status: Under way.

Contractor: **Mannix Co.,** Calgary, has 10 miles from Swan Hills to Ft. Assiniboine. **Banister-Helm, Ltd.,** has 40 miles from Ft. Assiniboine southward

Completion: November 1, 1958.

- **Independent Pipe Line Co.** (Home Oil Co.), Calgary.

Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.

Status: Proposed.

- **Mid-Continent Pipe Lines, Ltd.**

Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Saskatchewan, North Dakota, Minnesota, Wisconsin, and Illinois. United States section to be owned by International Oil Pipeline Corp., New York City.

Status: Pending Canadian Board of Transport Commission approval. **W. C. Gilman & Co.,** New York City, has made preliminary study.

- **Peace River Oil Pipe Line Co., Ltd.,** Calgary, Alta.

Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alberta.

Status: Approved.

- **Producers Pipelines, Ltd.,** Regina, Sask.

Project: 50 miles of 4, 6-in. gathering line extensions in fields in southeast Saskatchewan.

Status: Under way.

PIPELINE CONSTRUCTION

Contractor: **Majestic Contractors, Ltd.**, Edmonton.
Completion: October 30, 1958.

- **Westcoast Transmission Co., Ltd.**, Calgary.

Project: Line to parallel its 650-mile, 30-in. gas line from Peace River to Vancouver, B. C.
Status: Under way.

Canadian Products Pipelines

- **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.

Project: Gathering system to connect Alta. gasoline plants to trunk line from Alta. to Pacific Coast.
Status: Proposed.

- **Hydrocarbons Pipeline Co.**, Winnipeg, Man.

Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.
Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
Contractor: **Dutton - Williams Brothers, Ltd.**, Calgary, and **A. D. Little Co.**, Boston, are consultants.

Canadian Natural-Gas Pipelines

- **Alberta & Southern Transmission Co., Ltd.**

Project: 1,300 miles of 36-in. from Alberta, to San Francisco, plus 47 miles of gathering lines.
Status: Planned.
Completion: 1960.

- **British American Oil Co., Ltd.**, Toronto.

Project: 20 miles of 2 to 14-in. in Pincher Creek, Alberta.
Contractor: **Mannix Co., Ltd.**, Calgary, R. L. Tulford, superintendent

- **Northern Natural Gas Co.**, Omaha.

Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alberta.
Status: Planned.
Project: 32 miles of 24-in. from Pincher Creek to Montana border to tie in with planned United States line on to Minneapolis.
Status: Planned.

- **Northern Ontario Natural Gas Co., Ltd.**, Port Arthur, Ont.

Project: 90 miles of 10-in. from North Bay to Sudbury, Ont.
Status: Under way.
Contractor: **Mannix Co., Ltd.**, Calgary, Alta., V. D. Worcester, superintendent, office at Verner, Ont.
Completion: Late fall 1958.

- **Northern Ontario Pipe Line Crown Corp.**, Ottawa, Ont.

Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy); 360 miles from Port Arthur to Kapuskasing remains to be laid in 1958.
Status: Under way.
Contractor: **B. C. River Construction, Ltd.**, Longlac, Ont., has 91 miles from Longlac to Shekak River 30 miles west of Hearst, E. L. Maggard, superintendent, office at Longlac, to complete October 15, 1958. **Mannix Co., Ltd.**, Calgary, has 92 miles from 35 miles west of Hearst to Kapuskasing, Odis Hare, superintendent, office at Hearst. **Nelen, Ltd.**, Toronto, Ont., has 63 miles from Port Arthur to Nipigon River. **Majestic Contractors, Ltd.**, Edmonton, Alta., has 71 miles from Broadmore to Longlac. **Morrison-Shivers, Ltd.**, Dryden, Ont., has 48 miles from Nipigon River to Broadmore. **Pentzien Canada, Ltd.**, Toronto, has three major river crossings.
Completion: November 1958.

- **Van Tor Oil & Exploration Co.**, Vancouver, B. C.

Project: Line from British Columbia mainland to Vancouver Island.
Status: Proposed.
Completion: 1960.

- **Westcoast Transmission Co., Ltd.**, Calgary.

Project: 110 miles of 30-in. and 176 miles of 20-in. from East Calgary and Savanna Creek, Alberta, fields to Kingsgate on British Columbia-Idaho border.
Status: Planned.
Completion: November 1, 1958.
Project: Looping of present system to double capacity.
Status: Planned.

Foreign Crude-Oil Pipelines

- **Arabian American Oil Co.**, Dhahran, Saudi Arabia.

Project: 9 miles of 32-in. loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1960.
Project: 17 miles of 32-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1961.
Project: 9 miles of 30-in. extension of loop from Abqaiq toward Shedgum.
Status: Planned.
Completion: 1960.
Project: 12 miles of 30-in. extension of loop from Abqaiq toward Shedgum.

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PIPELINE CONSTRUCTION

Status: Planned.
Completion: 1961.
Project: 54 miles of 30-in. loop of Safaniya-Ras Tanura line.
Status: Planned.
Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.
Status: Planned.

• **Assam Oil Co.,** Digboi, Lakhimpur District, Assam, India.
Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.
Status: Survey of possible routes under way.
Contractor: **Pipe Line Engineering Co.,** Dallas, is making survey.

• **Bolivia-Paraguay.**
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned.
Contractor: **Five Lilles,** a French Combine.

• **Burmah Oil Co., Ltd.,** Glasgow, Scotland.
Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.
Status: Survey under way.
Contractor: **Collins Construction Co.,** Port Lavaca, Tex., is surveying locations for about 40 river crossings.

• **Cia. Shell de Venezuela.**
Project: 70 miles of 30, 34-in. heated line from Bachaquero to Puerto Miranda, and an unheated 31-in. parallel to the section from Cabimas to Puerto Miranda.
Status: Under way.
Contractor: **Williams Brothers Sudamericana, Ltd.**

• **Colon Oil Co.,** Caracas, Venezuela.
Project: 34 miles of 8-in. from El Rosario to Calvario in Venezuela.
Status: Planned.
Completion: February 1959.

• **Columbian Petroleum Co.**
Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia, S. A.
Status: Under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal),** and **Cie. Francaise des Petroles Algerie,** Paris, France.
Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.

• **Elburz Oil Corp.**
Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.
Status: Planned.

• **Iranian Oil Participants, Ltd.**
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.
Status: Planned.
Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.
Status: Planned.
Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.,** Tulsa, **Richard Costain, Ltd.,** and **John Brown, Ltd.,** London, and **Werkspoor & Bredoro,** The Netherlands.

• **Iraq Petroleum Co.,** London.
Project: 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.
Status: Proposed. Survey completed.
Project: 76 miles of 30-in. looping along the Kirkuk-Banias line.
Status: Under way.
Completion: Early 1959.

• **Kuwait Oil Co., Ltd.,** London.
Project: 61 miles of 30-in. from Raudhatain area to Ahmadi.
Status: Under way.
Completion: June 1959.
Project: 7 miles of 38, 40-in. No. 11 Gravity Line from North Ahmadi Tank Farm to North Pier.
Status: Planned.
Completion: December 1958.
Project: 7 miles of 38, 40-in. No. 12 Gravity Line.
Status: Planned.
Completion: April 1959.

• **Middle East Pipeline.**
Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

• **North-West Oil Pipeline Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N. J.) and British Petroleum Co., Ltd.).
Project: 230 miles of 28-in. from refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.
Status: Under way.
Contractor: **W. M. Lyles** jointly with two German steel firms.
Completion: November 1958.

• **Petroleo Brasileiro S. A. (Brazil).**
Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.
Status: Under way.
Contractor: **Techint, Inc.**

• **Rotterdam-Rhine Pipeline Co.**
Project: 185 miles of 30-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf, Wesseling, and Gelsenberg.
Status: Preliminary work under way.
Contractor: A group of German and Dutch firms.
Completion: 1960.

• **Royal Dutch-Shell.**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.
Status: Considering project as joint venture with several other companies.

• **SOPEG** (construction organization for Cie. Francaise des Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie).
Project: 412 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.
Status: Under way.
Contractor: **Entrepose Co.** and **Ste. Parisienne pour Industrie Electrique** have 281 miles. **SOCOMAN** and **Eau Assainissement** have 131 miles.
Completion: Late 1959.

• **South European Pipeline Co.** (Jersey Standard, Caltex, and 17 European firms).
Project: 932 miles of 30-in. from Marseilles, France, to Hamburg, Germany.
Status: Proposed.

• **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Balkal.
Status: Under way.
Project: Line from Russian fields to Czechoslovakia.
Status: Planned.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Planned.
Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).
Completion: Mid-1960.
Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca on the coast.
Status: Bids requested.
Project: 625 miles of 12-in. from Mendoza to San Lorenzo.
Status: Planned.

• **Yacimientos Petroliferos Fiscales Bolivianos, La Paz.**
Project: 174 miles of 10-in. and 44 miles of 8-in. from Sicasica, Bolivia, to Arica, Chile.
Status: Under way.
Contractor: **Williams Brothers Co.,** Tulsa.
Completion: November 1, 1958.

Foreign Products Pipelines

• **Empresa Nacional de Petroles Government of Chile** and **Cia. de Petroles de Chile (Copec), et al.,** Santiago, Chile.
Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.
Status: Planned.
Completion: Late 1958.

• **National Iranian Oil Co.,** Azna, Iran.
Project: 120 miles of 6-in. northward extension of its Abadan-Teheran system.
Status: Planned.
Contractor: **B. & M. Construction Corp.,** Oklahoma City.

• **Union of Soviet Socialist Republic.**
Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Balkal.
Status: Under way.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.
Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.
Status: Bids opened August 1958.

Foreign Natural-Gas Pipelines

• **Attock Oil Co., Ltd.,** London.
Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
Status: Planned.

• **Cuban Gas Transmission Co.**
Project: 500-mile line from Campeche area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.
Status: Under study by **Ebasco Services.**

• **Ferngas.**
Project: 45 miles of 12-in. from Semmering to Donawitz, Austria.
Status: Planned.
Contractor: **Mannesmann,** a German steel and construction firm.
Completion: Last half 1958.

• **Gaz de France.**
Project: 550 miles of 16 to 24-in. from Lacq field in southwestern France to Paris, plus 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
Status: Under way.
Contractor: French contractors.
Completion: Line to Lyons to be completed March 1959; line to Paris in 1960.

• **NIOGAS.**
Project: 160 miles of 6, 8, 10, 12-in. from Fischamend field to Vienna and other Austrian cities.
Status: Under way.
Contractor: **Williams Brothers Co.,** Tulsa, and **Costain-John Brown, Ltd.,** London.
Completion: Fall 1958.

• **Petroleos Mexicanos,** Mexico D. F.
Project: 130 miles of 22-in. to parallel a 14-in. line from Renosa to Monterrey.

• **Sui Gas Transmission Co.,** Multan, Punjab, India.
Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan, line. Extension will terminate at Lyallpur.
Status: Planned.

• **Union of Soviet Socialist Republic.**
Project: A 465 mile line from Karadag near Baku toTbilisi and Erevan.
Status: Under way.

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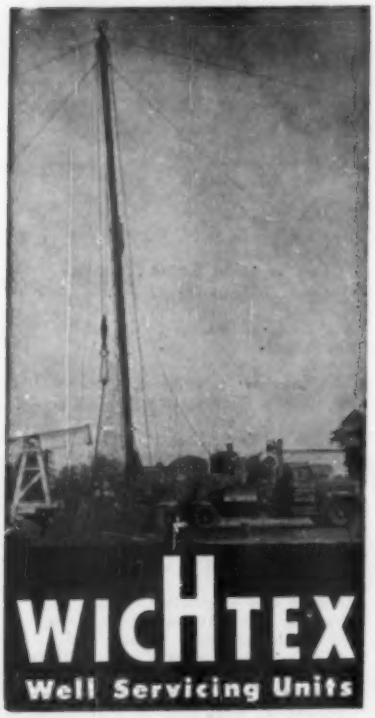

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▶ ▶ ▶ Among the Drilling Contractors

Mississippi deep field gives work to six contractor rigs

SIX contract rigs are keeping busy in development of South Mississippi's deep Raleigh field, the greatest concentration of drilling activity in that state.

Rimrock - Tidelands, Inc., of New Orleans, has two rigs in the field, and Shoreline Drilling Co., Shreveport; Zach Brooks Drilling Co., El Dorado, Ark., Marshall Young, Brookhaven, Miss.; and Larco Drilling Co., Jackson, Miss., one each.

All are working for California Co., except Larco, whose rig is on a Continental Oil Co. job. The latter is Continental's first in the field, where California Co. holds the major portion of the acreage with Central Oil Co. as joint owner on some.

Raleigh, in Smith County, was opened in January 1957. It now has seven wells. Four of these were drilled by Marshall Young and one each by Rimrock-Tidelands, Zack Brooks, and Dixilyn Drilling Co., of Odessa. Rimrock-Tidelands also drilled a deep dry hole, located about 1½ miles northeast of present production.

Production in the field is from the Bailey (Lower Cretaceous-Sligo) sand, in which only the discovery well has been completed, at 11,700 ft., and the deeper Lower Cretaceous Hosston section at depths of 12,200 to 12,700 ft. Wells are drilled to depths of 12,400 ft. to below 13,000 ft., the deepest so far being 13,409 ft. Rigs are on the wells from 90 to 100 days, running 150 to 200 ft. of 16-in. and about 2,000 ft. of 10¾-in. casing, and oil string through the producing section.

Who's getting the drilling contracts

Bryant-Hayward Drilling Co., Oklahoma City, has a rig working for Shell Oil Co. at a newly started wildcat about 12 miles south of Alva in southern Woods County, northwestern Oklahoma. Contract is for 6,150 ft. with location at 1 Lambert, in 21-25n-14w.

Viking Drilling Co., San Antonio, has a new 8,700-ft. contract operation northwest of Seadrift, in Calhoun County, Central Texas Gulf Coast. Drilling is for Shoreline Petroleum Corp. and Blanco Oil Co., also of San Antonio. Location, at 1 Lockwood, Andres & Newman, in the Miguel Castillo Survey, is just inshore at the upper end of San Antonio Bay.

Frio Drilling Co., Corpus Christi, is drlling on a 9,000-ft. contract at a wildcat location 5½ miles southeast of Corpus Christi, in Nueces County, Texas Gulf Coast. Operators are Carll Oil Co. and Southshore Oil & Development Co., of Corpus Christi, and George Coates, of San Antonio. Location is listed as 1 Eleanor Kelly, in Tract 1, Margaret Kelly Partition, near the west shore of Corpus Christi Bay.

Casey & Montgomery, Bakersfield, Calif., are slated for an 8,500-ft. exploratory drilling job north of Stenderup pool in the Mountain View area, southeast of Bakersfield, in Kern County, California. Norris Oil Co., the operator, has location at 41-16 Frick, in 16-31-29.

Graytex Drilling Co. is drilling on a wildcat location 15 miles south of Vernon, in Wilbarger County, North Texas. It is a 5,000-ft. test for Trice Production Co. Location, at 1-M Waggoner, is 3½ miles northwest of Trice's recently discovered Billie Jo Caddo field. Objective is the Caddo lime.

Holmes Drilling Co., Houston, has a rig running for Westland Oil Development Corp. at a wildcat location 8 miles southeast of Columbus, in Colorado County, Texas Gulf Coast. A 11,000-ft. test is planned with location at 1 Mugler, in the M. D. Ramsey Survey.

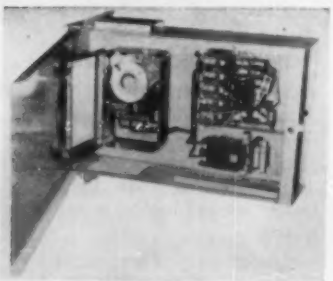
Goldrus Drilling Co., Houston, has contracted to drill a 10,000-ft. Ordovician test for McAlester Fuel Co., of Magnolia, Ark., in northeastern Mississippi's Black Warrior basin. It will be a far wildcat, 5½ miles northeast of Starkville, in Oktibbeha County. There is no production in this county, there have been few tests drilled, and nearest production is a gas well—a Mississippian gas well at Siloam, 7½ miles north in Clay County.

This week's SHOWCASE features . . .

Thermite welder doesn't misfire

. . . due to mixing of the starting and welding power through rough handling, the maker claims. The Thermoweld electrical connection obtainable with the powder and mold makes a simple and easy means of welding copper to copper or copper to steel in cathodic-protection installations.

The powder is packed in moisture-resistant polyethylene containers which are packed in hermetically sealed plastic bags to prevent moisture penetration and spillage. One feature of the molds is that they have a conductor clip that holds the lead wire firmly in place during the welding operation. **Write or call: Continental Industries, Inc., 7401 East Forty-First Street, Tulsa, for details on Thermoweld electrical connection.**



Well-control panel takes weather

. . . and can be installed in any location, the maker reports. The all-weather oil-well panel automatically controls single-phase pumping units up to 5 hp. at 220 volts, or 2 hp. at 110 volts, 60 cycle. All-steel construction is employed.

The new panel is particularly adapted for the control of shallow oil-well pumps. Main elements are a time clock, motor starter, and short-circuit protector. The time clock has adjustable settings over a 24-hour period. It comes housed in a separate compartment for protection against the elements and is readily accessible.

Electrical protection can be either a two-pole circuit breaker or a two-pole switch with fuses. The panel measures 11 by 19 by 5 in. and weighs 33 lb. **Write or call: Federal Pacific Electric Co., 50 Paris Street, Newark 1, for details on all-weather oil-well panel.**

Elevated pump motor assembly

. . . prevents damage to the oil-well pump motor from high water, drifting sand, or deep snow. The maker claims the cost of installing a pump unit with the new elevated power assembly is less than that for a standard power assembly because only the basic short-stub-base pumping unit is needed. The result is less concrete for foundation, and fewer anchor bolts.

The brake lever is at a convenient operating height. Its bracket serves as a handy step to reach the assembly platform. Conversion to other types of prime mover assemblies is easy. Just unbolt the elevated assembly from the reducer subbase. **Write or call: Bethlehem Supply Co., 21 East Second Street, Tulsa 3, for details on elevated power assembly.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

.....

Described in OIL AND GAS JOURNAL - Issue of **September 29, 1958**

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....

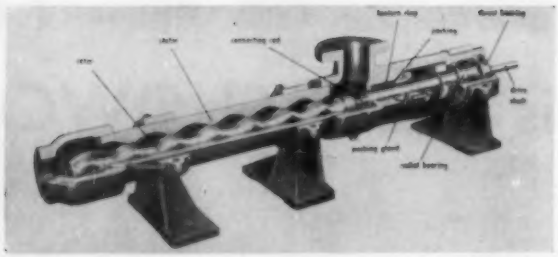
DATE.....

SHOWCASE . . .

New Equipment

Pump moves fluid without pulses

. . . in tank-battery or salt-water-disposal service. Employing a "moyno" principle, the pump can handle abrasive fluids and still maintain excellent suction and pressure characteristics, the maker claims.



For salt-water-disposal service, the pump employs a grit-seal assembly to cover the connecting rod and pin joints. To prevent blowouts, the packing is on the suction or low-pressure side.

The pump can be driven by either an electric motor or an internal-combustion engine. Little maintenance is required, and it can be done in the field with simple tools. **Write or call: C-H Pump Sales Co., P. O. Box 10584, Dallas 7, for details on Moyno pump.**

33 WEST TEXAS OIL WELLS PROTECTED FROM EXTERNAL CASING CORROSION BY CSI

Two casing leaks in West Texas oil wells cost this company more than $25,000 each. External corrosion proved to be the cause.

The company then decided to protect 33 of its other West Texas wells cathodically. CSI was awarded the job on a competitive bid basis.

CSI engineers—pioneers in well protection work—furnished all the engineering, labor, materials and equipment needed. Rectifiers were used as the applied current source. The job was done in 10 consecutive days for about $330 per well.

You'll find it pays to call CSI for engineering, installation services or quality cathodic protection supplies. Call or write today—quotations or estimates without obligation.

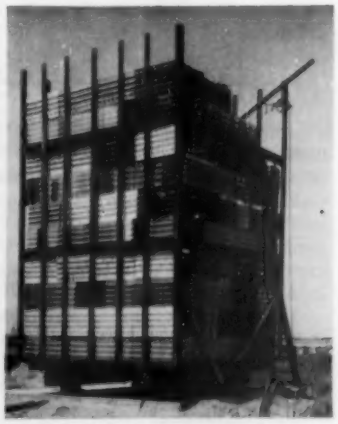
Ask for Free Copies of the latest CSI Reports on "Hot Spot Protection for Pipelines" and "The Truth about the Current Efficiency of Galvomag Anodes."

CSI

CORROSION SERVICES INCORPORATED

Cleveland 13, Ohio
1309 Washington Ave.
Tel. CHerry 1-7795

General Office: Tulsa, Okla.
Box 7343, Dept. J-19
Tel. Circle 5-1351



Plastic packing aids waste treatment

. . . and helps prevent stream pollution from refineries and petrochemical plants. The plastic packing material is designed to improve the conditions under which microorganisms oxidize wastes.

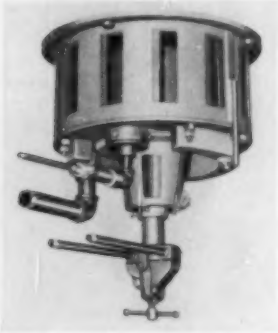
Trademarked Dowpac, it has been field-tested extensively in the treatment of wastes from chemical plants and refineries. The packing is made up of many layers of corrugated sheets of Styron (Dow polystyrene) or Saran, depending on the type of chemical resistance needed.

The corrugated shape, for example, provides large surface areas to which waste-treating bacteria can adhere. And it permits large-volume air flow through the packing to supply the bacteria with necessary oxygen. Waste flow rates in excess of 800 million gallons per acre per day have been applied to the Dowpac with no evidence of restricted air circulation.

The packing weighs one-twentieth that of conventional rock packing. It permits wide latitude in design of oxidation systems. Assembled in self-supporting units, it can be stacked as

high at 42 ft. with simple underdrains. **Write or call: The Dow Chemical Co., Midland, Mich., for details on Dowpac.**

●



Oil, gas-burner design improved

. . . to prevent dripping oil from falling back into the gas burner during operation on oil or a combination of fuels. The oil burner is located so you can observe and check its tip condition without shutdown. Also, the oil gun can be removed while firing gas, and the gas burner can be removed while firing oil.

The Series DA-3 is a dual-muffle burner designed primarily for vertical firing. Six sizes are available. They range from 750,000 to 20 million B.t.u. per hour. **Write or call: John Zink Co., P. O. Box 7216, Tulsa, for Bulletin DA-858.**

●

Retriever gets packer in one trip

. . . the maker reports. The packer retriever, designed for one-trip recovery, will pass through the bore of the packer in a catching position. It protects against loss of the packer during milling operations.

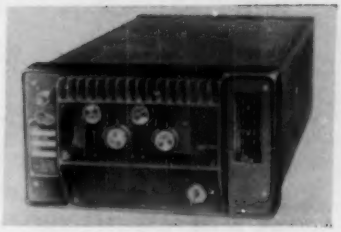
After the packer has been milled over enough, it will pull the packer, and it will release from the packer in the hole if needed and reset to a catching position.

The retriever is made from alloy steel. Threads atop the mandrel allow connections with the top sub. A skirt provides a means for locking the mandrel and release body together to prevent relative rotation. The top sub connects the tool to the stinger or extension and a key prevents the release body from tightening up on the mandrel and locking the threads. **Write or call Bowen Itco, Inc., P. O. Box 4587, Houston 13, for details on packer retriever.**

VHF two-way mobile radio

. . . has transistor power supply. The power supply replaces vibrators and lowers maintenance, increases efficiency, and causes less current drain, the maker claims. Rapid and effective heat dissipation is obtained by using the entire front-panel casting as a heat sink. The design is said to be conservative. Supplies for 30-watt S-Series mobile equipment use four transistors; those for 60 and 100-watt equipment use six transistors.

The silicon rectifiers will provide long life and good regulation, the



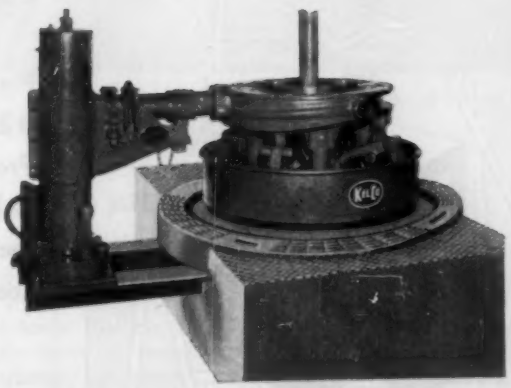
maker says. Power supplies are protected by primary and secondary fusing. They have polarity protection too. **Write or call: Link-by-Gonset Div., Young Spring & Wire Corp., 801 South Main Street, Burbank, Calif., for details on VHF mobile radio.**

THERE IS NO SAFER EQUIPMENT

KELCO

BREAKOUT AND SPINNING LINE CATHEADS

KELCO **AIR OPERATED POWER SLIPS**



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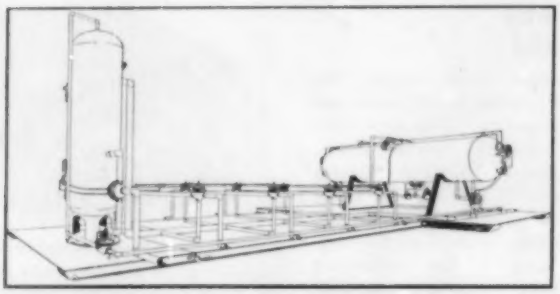


Packaged test and production

. . . is prefabricated for easy field installation. The new Odex unit measures both the total production of the lease and the oil, gas, and water from each well in sequence.

Designed for automatic operation, it can be controlled either at the lease or at a remote central office to program and monitor production and to receive instant warnings of off-normal conditions.

For simple field installation, the unit is preengineered to the lease requirements. It is prefabricated in three skid-mounted sections—metering separator, manifold, and metering free-water knockout. Additional manifold units are easily tied in as the number of wells increases.

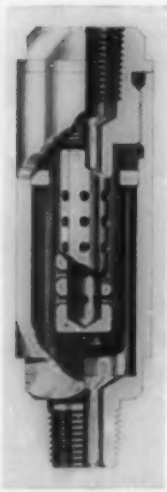
According to the maker, the unit offers the opportunity for operators to increase efficiency through accurate, up-to-the-minute data, gathered with a minimum of man-hours. Failure warnings help reduce lost production time. **Write or call: Odex Engineering Co., 1410 North Grant, Odessa, Tex., for details on packaged test and production unit.**

●

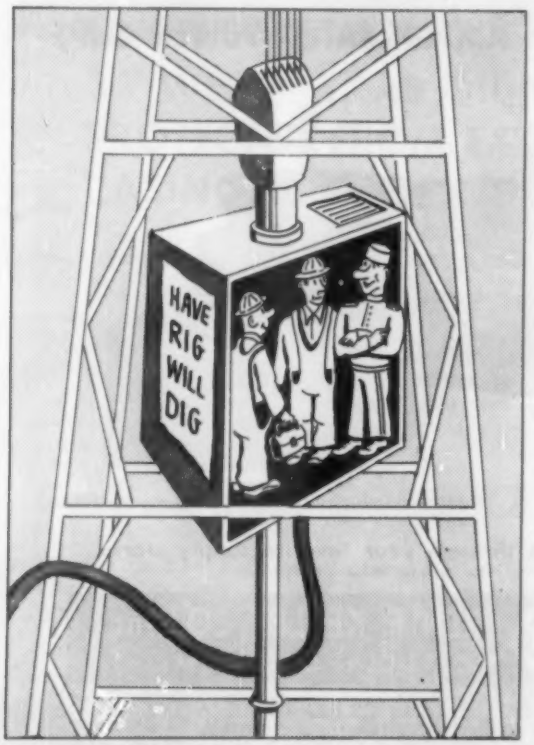
Check valve for dual wells

. . . promises to prevent any possible means of communication between zones where mud, sand, or other debris may be present in the annulus.

The valve is a normally closed type with a 5,000-psi. working pressure



and ½-in. pipe-thread connections. It consists of a resilient Hycar sleeve built around a ported-mandrel tube and enclosed by a stainless-steel or Monel valve body. When back pressure is applied, the sleeve seals off the ports in the mandrel tube and prevents backflow. The Hycar sleeve is the only moving part and is resistant to abrasion and acids. **Write or call: Macco Oil Tool Co., Inc., P. O. Box 7288, Houston 8, for details on auxiliary check valve.**



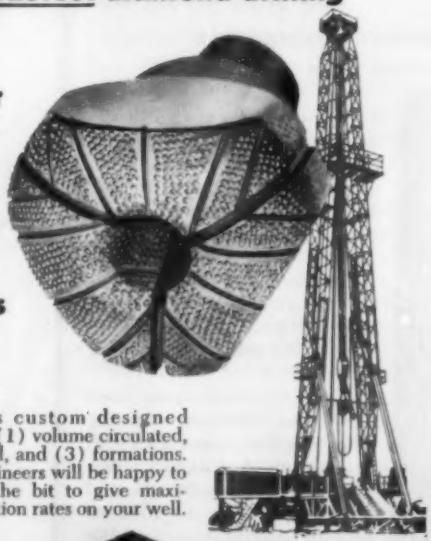
THE OIL AND GAS JOURNAL

"Third floor. Watch your step, please."

SPECIFY TRI-DIA TODAY!

for fastest diamond drilling

Plan your D & S Bit Program to Fit these Conditions



Each bit is custom designed according to (1) volume circulated, (2) type mud, and (3) formations. Our sales engineers will be happy to recommend the bit to give maximum penetration rates on your well.

TRUCO DIAMOND BITS

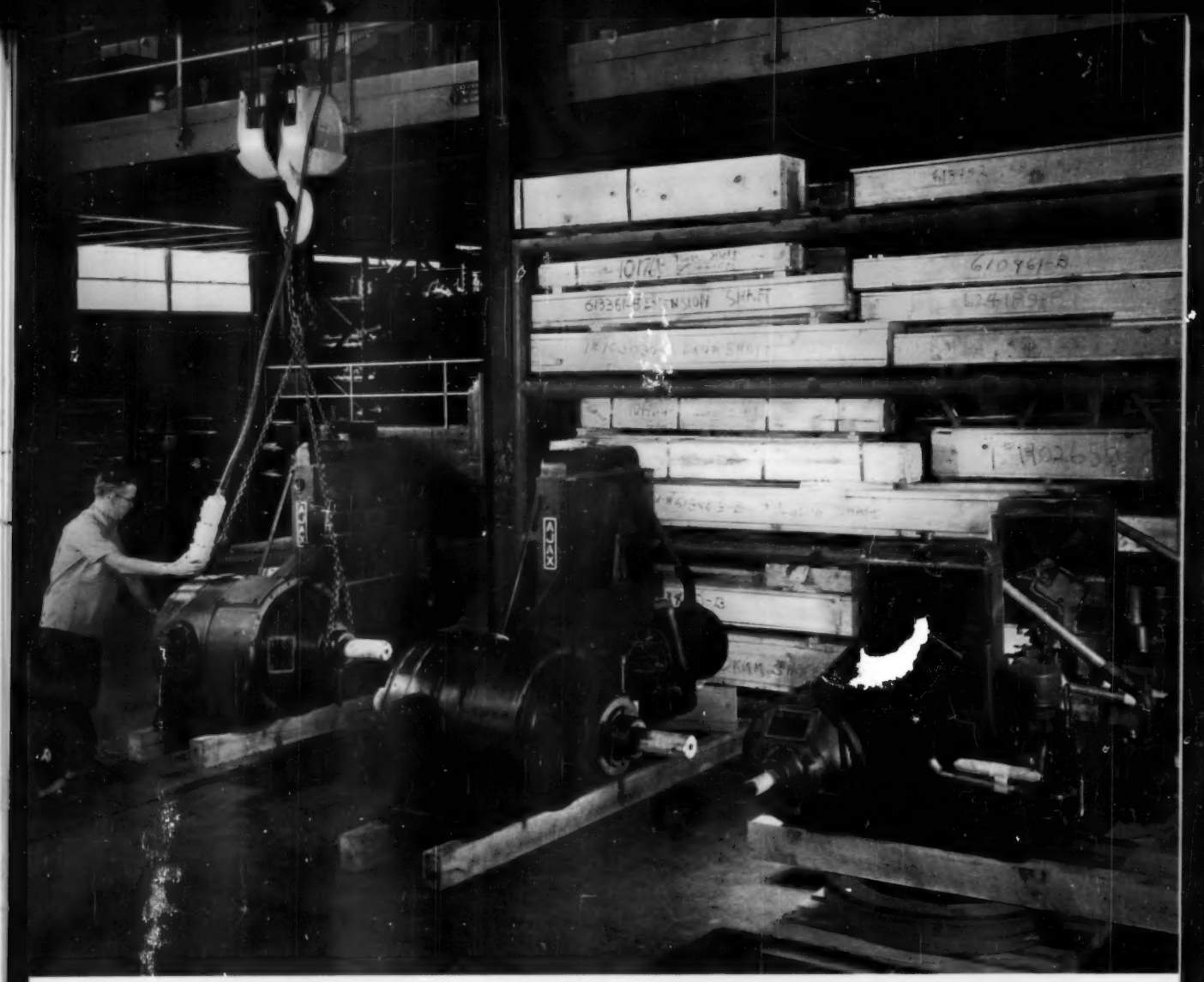
Drilling & Service INC.

DIAMOND DRILLING EQUIPMENT

6210 NORTH CENTRAL EXPRESSWAY • DALLAS, TEXAS

OFFICES IN ALL PRINCIPAL OIL AREAS

Ultra Fine Diamond Equipment for the Oilfield



Ajax Engines are typical of the line of quality equipment stocked and distributed through National's 130 stores.

You'll get ideas in our warehouse, too!

The truth of the old saying, "Out of sight, out of mind," often bothers us. We know that every National Supply Store is well-stocked with quality equipment like these Ajax Engines . . . but you'll probably never see much if you do all your shopping at the counter. In fact, what you see from the front counter is such a small part of our ample stocks that we'd often like to remove it!

We won't eliminate this convenience, of course. But we can urge you to walk behind it any time and get better acquainted with the *whole* National Supply Store. You'll see equipment like these Ajax Engines . . . Link-Belt Chain . . . Oilmaster Pumps . . . Tube-Turn fittings . . . Rockwell-Nordstrom Valves. The list of outstanding equipment is a long one, and we're pleased to be associated with every name on it. More important, it's equipment we know you can use to operate profitably.

So shop behind our counter, too —in places like the warehouse, equipment yard and pump shop. It's a tour you owe to yourself, because the "*in* sight, *in* mind" experience can produce some good ideas for improving your own operations. We know. We've seen it happen many times.

This view of a National Wellhead beneath an offshore rig platform shows one of the largest wellhead assemblies ever manufactured.

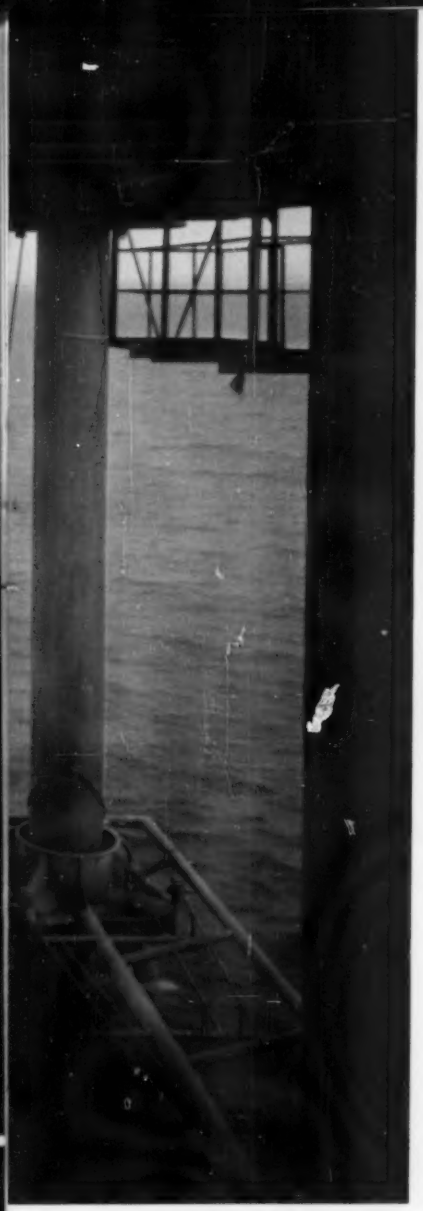
You get these 6 big advantages with National Wellhead Equipment—

1. **Ease of assembly**—The overall simplicity of National Wellhead design makes every unit easy to assemble and maintain. Parts are self-locating and self-activating, and no special tools or adjustments are needed for installation.

2. **Maximum flexibility**—National's precision-engineered units are interchangeable, thus permitting an unlimited number of combinations to meet your specific requirements in size, capacity and type.

3. **Pre-tested safety**—National's triple-sealed Pressure Pack design insures trouble-free performance and longer service life. Intensive pressure testing procedures are more severe than those specified by API standards.

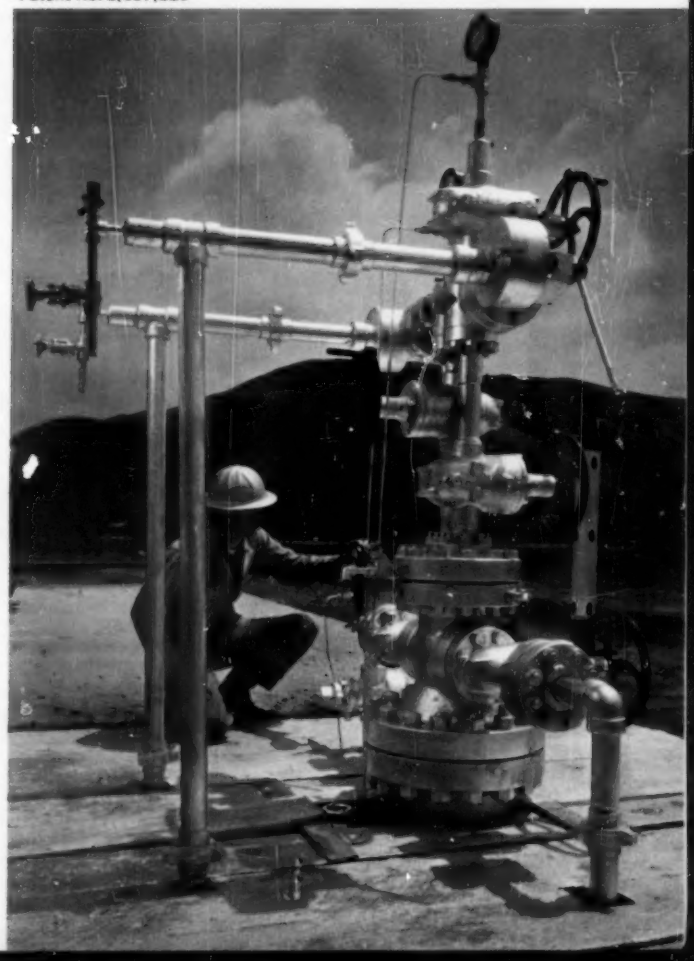
4. **Multiple completion designs**—There are five types of dual string equipment in National's line—all designed for safe, profitable completions in a full range of working pressures. National triple completion assemblies are also available.



A "flange eye" view in National's Houston plant shows the stamping of serial numbers on units during the production process. The Houston Plant is devoted exclusively to wellhead manufacturing.

This National Supply dual completion assembly is located near Ventura, California. It utilizes the time-proven Laurent* seal to give sealed-in-steel construction for the life of the well.

*Patent No. 2,687,229



5. Readily available stocks—Through National's oilfield supply store network—largest in the world—you can readily obtain this quality wellhead equipment.

6. Experienced advisory service—Complete advisory service on any wellhead application problems is available through any National Store or office. An experienced staff of National Wellhead specialists provides help wherever needed.

With this group of advantages, you can see why it pays to use National Wellhead Equipment and the service that comes with it. Ask the National representative in your area for full details.

More National equipment for profitable production on the next page...

National Triplex Pumps are reliable on a host of oilfield pumping jobs including water-flooding, salt water disposals, and as power-oil sources for subsurface hydraulic pumps.

...and you get low-cost pumping with National Triplex Pumps!

A minimum of pumping downtime means low-cost pumping, and that's what you get with National Triplex units. They have heavy-duty housings and frames, long-life bearings, stainless steel valves, and National's time-proven lubrication systems.

Plungers, fluid ends and cartridge-type stuffing boxes are readily interchangeable to meet varying pressure and volume needs, and are available for either corrosive or non-corrosive service. In every respect, these triplex pumps show the quality construction for which all National Supply equipment is famous.

Ask the National representative in your area for more information on National Triplex Pumps—and any of the other dependable production equipment shown on this page.

Get reliable service from precision-made National Sucker Rods. They have top resistance to fatigue, shock, corrosion and impulse loads. National Sucker Rods are available in a range of grades to meet every well condition.

National Pumping Units are manufactured in 22 standard combinations, plus various long stroke and portable variations. In the range of API rated beam loads from 3,200 to 32,400 lbs., there's a unit to economically meet your needs.

National Plunger Lift can be the best production method for certain types of wells. It uses formation gas or injected gas for operation, has low initial and service costs. Equipment is also available for gas well operation to remove liquids and maintain a uniform and increased flow rate of gas.

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

TWO GATEWAY CENTER, PITTSBURGH, PA.

DIVISION OFFICES: Calgary, Dallas, Denver, Hou to, Torrance, Tulsa

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall Hou ell Street, London E.C.1

SHOWCASE . . .

New Literature

Digital-computer control and data logging

. . . is reviewed in a new four-page brochure. Included in the bulletin is a description of the RW-300 computer as well as discussions of process control, data logging, pilot plant, and test facility applications for computer-control systems. Detailed specifications are listed for the transistorized computer. It can handle up to 1,024 analog inputs and up to 128 analog outputs. It can also operate with a wide range of digital input and output equipment. **Write or call: Thompson-Ramo-Wooldridge Products Co., P. O. Box 45067, Airport Station, Los Angeles 45, for details on digital computer control bulletin.**

Repair pipeline leaks

. . . quickly and effectively, as described in a new four-page bulletin. It gives simple, step-by-step instructions on using repair gaskets which are shaped to fit. Gaskets can be either welded or clamped. Gaskets in field service 5 years show no signs of deterioration, the maker reports. Approximate thickness measurements are also included. **Write or call: Dallas Mfg. Co., P. O. Box 7181, Dallas 9, for pipeline leak-repair bulletin.**

New fencing catalog

. . . details chain-link fencing for industrial protection, along with other fence installations. The 36-page booklet includes specifications and erection instructions. It also reviews concrete-panel, steel palisade, corrugated-sheet, and close-boarded fencing. **Write or call: Boulton & Paul, Ltd., Fencing Dept., Riverside Works, Norwich, Norfolk, England.**

Automatic pilot plants

. . . for process studies are described in new four-page Bulletin 3013. In it are contained two diagrams—one past, one future—in which the maker shows what may be expected on the market soon. Today, recorder and controlier information, plus test results from labs, are given to the operator. He then provides the necessary process-control feedback. In the future, the company points out, all feedback will be automatic via the computer. The operator will exercise manual control at will. The bulletin gives detailed information about the plant, instruments, composition analysis, and logging and scanning. It also discusses the computer, programer, and system operation and use. **Write or call: Systems Div., Consolidated Electrodynamics, 300 North Sierra Madre Villa, Pasadena, Calif.**

Portable drill and pump

. . . for geophysical exploration work and the points of interest of each are discussed in a new eight-page bulletin now obtainable. The Model 54 portable drill consists of only five basic parts and it can be set up and disassembled in about 5 minutes. Its total weight, engine included, is only 488 lb., and it can drill in rock, gravel, sands, and clays to 175 ft. The drill is fast and flexible the maker reports. The 311-lb. Model 53 reciprocating portable pump has adequate capacity for ordinary drilling operations. Specifications for both drill and pump are included. A separate bulletin—entitled simply Petty—also is available. It describes the company, its management, operations, etc., which manufactures these products. **Write or call: Petty Geophysical Engineering Co., 807 Transit Tower Bldg., San Antonio, for portable drill and pump catalog and/or Petty bulletin.**

Photo-drawing technique

. . . is detailed in a new four-page bulletin. Called Photoneering, the new process combines photography and drawing. Specifications can be drawn directly on a photograph taken from any angle or point or perspective. A special heat and humidity resistant plastic film sheet is used which permits necessary changes or erasures. The brochure tells how photography and drawing combine to save time and money and make engineering drawings easy to visualize with minimum interpretation. **Write or call: Technical Reproduction Service, 375 South Street, Newark 5, for Photoneering bulletin.**

Air-cooled heat exchanger

. . . Sales Catalog S-395 has been revised and is now available. About one-third of the catalog details the types of units normally used in various industrial and process-cooling applications. Two basic models—vertical or horizontal air flow—and 23 sizes are covered in the catalog. Also information is included on equipment which may be specified to operate on a forced or induced-draft arrangement. **Write or call: Trane Co., La Crosse, Wis., for Catalog S-395.**

CM1

TRADE MARK
TIME TESTED
MACCO
GAS LIFT
REG. U.S. PAT. OFF.

MACCO DUAL COMPLETION EQUIPMENT
"Capsule" Mandrel and CM1 (1" O.D.)
Gas Lift Valve

The "capsule" type mandrel is available from stock for all standard dual, macaroni, and slim-hole lift. Special sizes are manufactured upon request. With the valve and check valve mounted inside, this type of mandrel provides extra large flow areas for the well fluids. The producing zones of parallel or concentric dual completions may be simultaneously lifted by either a "common" or "separate" gas supply. Macaroni tubing lowered inside of the regular tubing has proved a highly successful means of lifting wells where it is objectionable to pull the regular tubing. Efficient lift inside of small liners is also made possible.

The Macco fluid operated valve is particularly suited for dual completion lifting. A typical installation consists of separate, parallel strings of tubing, each equipped with Macco fluid operated valves mounted in capsule mandrels. The fluid of each zone controls the opening and closing of its valves. The casing annulus serves as the gas supply for each string of valves. Valve interference is eliminated and each zone is lifted independently of the other. No surface equipment other than a choke in the gas input line is needed.

Macco manufactures many different types of dual completion equipment to fit any well requirement. For further information, write for Brochures No. 3-12, 3-21, and 3-31.

MACCO OIL TOOL COMPANY, INC.

1521 Prince P. O. Box 7288 Houston 8, Texas
Phone UN 1-1253

EQUIPMENT MEN

Walter G. Johnson named

. . . general manager in Houston for Union Tank Division, Butler Manufacturing Co. He joined Butler Manufacturing in 1939 as a stock boy. He was transferred soon after into the cost accounting department, later becoming manager. He was vice president and general manager of Butler Manufacturing Co. (Canada), Ltd., until his recent promotion.

R. N. Mullin appointed

. . . as director of the petroleum industry activities of Sumner Sollitt Co. of Chicago, according to Sumner S. Sollitt, president. Mullin recently retired from Gulf Oil Corp. Prior to his connection with Gulf, he had been with Continental Oil Co. and Phillips Petroleum Co.

J. E. Campbell opens

. . . an office in Denver, Colo., to represent companies selling to the oil industry in the Rocky Mountain area. He has been with Chemical & Geological Laboratories for 13 years. He has worked also with Colox, Baroid Division, American Pipe & Supply, and Security Engineering Co. This new type of service, was established to provide sales representation in the Denver area when use of a full-time company salesman is not justfied.

Appointments, transfers made

. . . by Baroid Division, National Lead Co., in its drilling mud department. K. S. Lewis, assistant manager of lower Texas Gulf Coast area, transfers to Corpus Christi, Tex. R. E. Killion, formerly sales representative in Houston, is now district superintendent at McAllen, Tex. F. J. Wright, service engineer, was named store manager at Edinburg, Tex., and W. W. Ames, service engineer, was appointed store manager at Corpus Christi. Jay Crist joins Baroid as store manager at Jourdanton; and June Wallace joins the division as store manager at Tyler, Tex.

In West Texas, J. T. Blaney, Jr., formerly district superintendent at Abilene, becomes assistant area manager there. He is replaced by E. L. Easley, formerly district superintendent at Wichita Falls, Tex. J. D. Newson, district sales representative, replaced Easley. In the Rocky Mountain area, store manager E. A. Fine, Jr., has been named district superintendent in Williston, N. D., and F. M. Estep was named district sales representative at Billings, Mont.

In the Louisiana Gulf Coast area, H. J. Thompson, service engineer, was appointed store manager at Shreveport, La. G. G. Moles, service engineer, was appointed store manager at Homer, La. S. E. Marrs, sales representative at Lafayette, La., becomes store manager at Monroe, La. J. Lamar Smith, Jr., service engineer, shifts from Lafayette to Magnolia, Ark., as store manager. J. B. Wheat, sales representative, transfers from Lake Charles, La., to Jackson, Miss. P. E. Silver, service engineer, moves from Lake Charles to become store manager at Brookhaven, Miss. J. A. Conway, service engineer at Lake Charles was named store manager at Natchez, Miss. Sam Hailey, formerly of Sam Hailey Mud & Chemical Co., joins Baroid as store manager at Canton, Miss.

H. J. Tullos organizes

. . . Petroleum Laboratories, Inc., Houston, to specialize in Podbielniak and Chromatographic analysis of petroleum products and chemical analysis of related materials. Tullos has over 14 years' experience in supervising similar analysis.

T. N. Shults named

T. N. Shults

. . . president of Mid - Continent Cummins Export Corp. Ken W. Davis, former president, has become chairman of the board. Shults is vice president of Mid - Continent Supply Co. D. H. Thornbury, president of Mid-Continent, has been named vice president of Mid-Continent Cummins. Jack George was also named vice president.

B. A. Abercrombie named

B. A. Abercrombie

. . . as assistant to the vice president, engineering, of Garrett Oil Tools, Inc., a division of U. S. Industries, Inc., reports Taylor Milton, president. Abercrombie, formerly sales engineer in the Houston district, moves to the home office at Longview, Tex. He joined Garrett in 1955. Prior to that he worked with Texas Pipeline Co., Tulsa; Lockwood & Andrews, Houston; and J. S. Abercrombie in Gonzales, Tex.

$25 million expansion reported

. . . for Reed Roller Bit Co. by its recently-elected president, John F. Maher. About $20 million of the program is earmarked for the Houston plant. The expenditure is scheduled over the next 5-year period.

In addition to the expansion, Maher outlined sales targets of $50 million by June 1961, about $15 million beyond the total for 1957.

Exports by Reed in 1957 accounted for about 45% of total sales and 55% of profit.

Although the firm will emphasize domestic sales, Howard Book, Reed vice president for sales, said that prospects are that foreign drilling will double within 7 years and that his company's export sales will continue to rise.

New Reed policies and objectives are being sketched in for management men brought to Houston from areas throughout oil country, both in the United States and foreign fields.

Jack Grundy, vice president for manufacturing said that a major share of equipment expenditures in Houston will go for the latest in forging, turning, and heat treating units.

Related to the expansion program, the company announced that R. C. Gann, former Oklahoma division manager has been shifted to Casper, Wyo., and W. H. Armstrong, head of the Kansas division, has been moved to Oklahoma City to head the new Oklahoma-Kansas division.

According to Wiley Noble, vice president of engineering, the Reed buildup will put heavy stress on new personnel, utilizing young men coming from colleges in an energized research and development program.

Maher emphasized that Reed's new board chairman, Ray O. Shaffer, is the "idea man" on the new team.

Allied Paint Mfg. Co. names

... Ralph E. Nackerud as regional manager of its new factory outlet in Denver, Colo. He was previously employed for more than 27 years by another paint company. The factory branch warehouse of Allied Paint will stock a complete line of industrial coatings.

C. E. Lamar promoted

... to assistant sales manager for Southern Pipe & Casing Co., a division of U. S. Industries, Inc. He has been in engineering and sales at Southern Pipe for the last 7 years. Southern Pipe manufactures welded steel pipe for water, gas and oil transmission.

Oil well service firm formed

... by the coalition of Thorson Oilfield Cementing, Ltd., Strata Testers, Ltd., and BJ Service, Inc. The new firm will be known as BJ Service of Canada, Ltd. The announcement was made jointly by G. M. Davis, president of the new firm, and J. B. Merritt, executive vice president and general manager of BJ Service. Administrative offices will be located in Edmonton, Alta. The Canadian firm will have two operating divisions. A. E. Thorson, former president of the firm bearing his name, will be vice president in charge of the cementing division. Murray Varty, former president of Strata Testers, will be vice president in charge of the testing division.

Worthington Corp. adopts

...a new trademark to replace the 73-year-old winged trademark. Adoption of the new trademark follows by 6 years the abandonment of Worthington Pump & Machinery Corp. Today it is simply called Worthington Corp. A typical use of the new Worthington trademark is shown by V. M. Holmes, assistant manager of engine sales, and George Stevens, general manager of the compressor and engine division.

Cooper-Bessemer Corp. names

C. H. Sanders

... C. Horace Sanders to the position of Southwest district manager, according to Grant C. Woodard, general sales manager. In his new capacity, Sanders replaces A. A. Burrell. Sanders has been with Cooper-Bessemer since 1927. He was assistant Southwest district manager until his present promotion.

Joseph D. Lowery appointed

... assistant general sales manager of the Industrial Chemicals Division, American Cyanamid Co., according to George W. Russell, division manager. A veteran of 36 years with Cyanamid, Lowery was formerly manager of the heavy chemicals department. He has also held a variety of executive sales and administrative posts with the company.

W. C. Wadsworth appointed

W. C. Wadsworth

... as assistant to John T. Knight, Jr., manager of Norvell-Wilder Supply Co.'s sales office at Tulsa. He had previously been the sales representative in the Tulsa territory for a valve manufacturer since 1932. Prior to that he served with Parkersburg Rig & Reel Co.

J. C. Deyo appointed

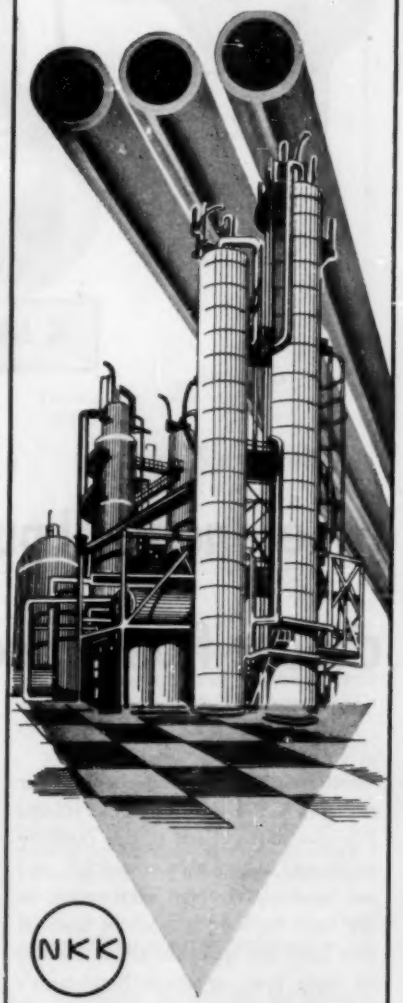
... to the post of treasurer of National Steel & Shipbuilding Corp. He was formerly with Convair, a division of General Dynamics, in the industrial relations field and for many years was a special agent for the Internal Revenue Service of the U. S. Treasury Department. In his new assignment, he will administer the credit and fiscal policies of the company.

Tex-Tube, Inc., adds

... Thomas P. Toudouze to its sales staff in the Houston area. He was a mud engineer for Baroid Division, National Lead Co., in Texas, California, and Utah, before joining Tex-Tube. Tex-Tube is a producer and supplier of oil country tubular goods.

Pipe & Tube

For Oil & Gas Industries



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These four types of Bethlehem sucker rods will handle a wide range of pumping conditions. Each rod is carefully made and thoroughly inspected, and can be counted on to keep strings in the hole for long periods of time. If you have any question about the use of these rods, or about Bethlehem's full line of sucker rod accessories, get in touch with your Bethlehem sucker-rod distributor. Or, if you prefer, the nearest Bethlehem sales office will gladly give you full details.

ROD	TYPE	HEAT TREATMENT	YIELD POINT psi		TENSILE STRENGTH psi	
			Min.	Av.	Min.	Av.
X 2	Carbon-manganese	Normalized	65,000	72,000	93,000	100,000
X Mayari	Nickel-chromium	Normalized	60,000	65,000	88,000	95,000
46	Nickel-molybdenum	Normalized and tempered	67,000	75,000	82,000	90,000
43	Nickel-chromium-molybdenum	Normalized and tempered	100,000	110,000	120,000	130,000

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BETHLEHEM STEEL

Alberta's Devonian gets a three-bagger

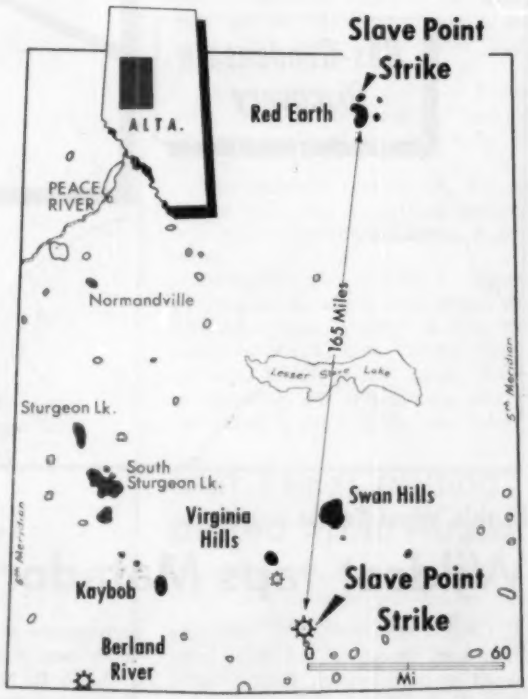
BY FRANK J. GARDNER

THE WESTERN PLAINS of Alberta provided a thumping overture to the Canadian fall drilling campaign last week. As operators began to map strategy for the coming season, three extremely important discoveries, all from the same formation, boomed into the news.

The recovery of commercial oil shows in the Beaverhill Lake-Devonian rocks at three widely separated wildcats puts that formation in the forefront of Canadian drilling targets for the winter. These rocks had never produced any significant amount of oil before January 1957, and they were largely ignored as a reservoir objective. But since that time, the prolific Swan Hills, Virginia Hills, and Kaybob fields, all Beaverhill Lake producers, have made them a prize attraction.

In the north . . . The first of the three new discoveries occurred at Red Earth field, northernmost oil field in Alberta. Here, Union Oil Co. of California had finished nine oil wells, all in the granite wash pay, and half a dozen dry holes. Its 4-20 wildcat appeared to be another failure, for tests in the field pay at 4,722-67 ft. found it water-laden; but Union backed up the hole to 4,170-4,255 ft. for a test of the Beaverhill Lake before abandoning. The resulting recovery of 1,410 ft. of free oil at that level gave Red Earth a new pay and added thousands of square miles to the Devonian hunting ground. The well, located on LSD 4, 20-88-8w5, has dry offsets to the north, south, and east, isolating it from the field proper.

South . . . At almost the same time, a second Beaverhill Lake strike occurred 165 miles due south of Red Earth. At North Whitecourt, on LSD 6, 1-62-12w5, Mobil Oil of Canada, Ltd., found good shows of oil on a test at 8,918-43 ft. This was the fourth test of the Beaverhill Lake section; gas flow was measured at 8,600 M.c.f. per day and pipe recovery was 2,000 ft. of water cushion plus 952 ft. of 42°-gravity oil. The three earlier tests had shows of gas, condensate, and oil, but this fourth one firmly convinced Mobil that it had found a new Devonian field. Coring and testing operations continue here.



NEW discoveries in the Devonian Slave Point-Beaverhill Lake rocks have expanded the hunting for pools in that section by thousands of square miles. Previously, the formation had produced oil only at Swan Hills, Virginia Hills, and Kaybob. New strikes at Red Earth field, North Whitecourt, and Girouxville add fresh interest to the Slave Point search over all the western plains of Alberta.

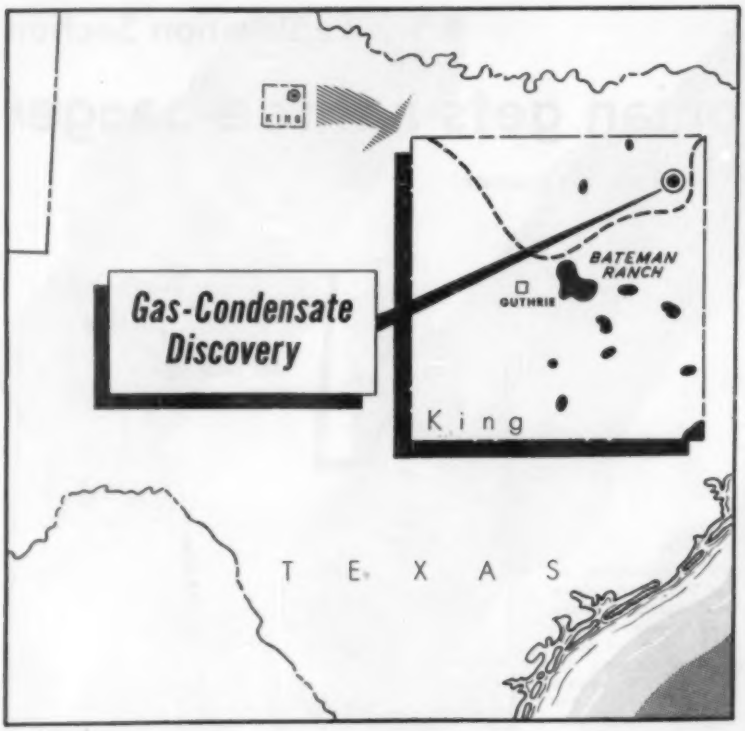
And west . . . As this goes to press, a third Beaverhill Lake discovery is indicated at Girouxville. It came too late for this map, but it lies on LSD 16, 17-77-22w5, 10½ miles south of Normandville field and 80 miles north of Kaybob. If it makes a well, it will broaden the Beaverhill Lake search another hundred miles to the northwest. The well, Colorado Oil & Gas, Ltd., et al Girouxville 16-17, tested the section at 7,890-7,910 ft. Recovery in the pipe was 100 ft. of clean brown oil, gravity 41°, plus 50 ft. of oil-cut mud. While it was hardly a decisive test, the operators are hopeful of opening a new Devonian field here. They've run production casing to the tested level. The original objective, the Devonian D-3, was water-bearing in this wildcat.

The payoff will come . . . These three events are highly significant. They foreshadow the discovery of many more major oil fields in Alberta's grizzly bear preserve. The 1,000 to 1,500-bbl. wells at Swan Hills, Virginia Hills, and Kaybob are ample evidence that this new reservoir rock will add significantly to Canadian reserves.

A word about nomenclature is in order here. The name "Slave Point" (as used on the map) frequently appears in print as the name of the producing horizon in these Beaverhill Lake fields. In a recent description of Swan Hills field (OGJ, Aug. 18, 1958, p. 169), Home Oil Co. geologists clarified the nomenclature as follows:

"The lower portion (of the producing formation) has been referred to as the 'Slave Point,' basal Beaverhill Lake, or Beaverhill Lake reef . . . It will be referred to as the Lower Member where it is predominantly nonreefoid, and as the Beaverhill Lake reef where it is predominantly reefy and shows strong vertical development."

So call it Beaverhill Lake, or call it Slave Point. In any case, you'll be hearing a great deal more about it.



In this West Texas area . . .

Wildcat taps Matador arch

A GAS-CONDENSATE discovery from reef limestone has been completed in northwestern King County, West Texas. It is in an area that has had little exploration, and is on the eastern end of the Matador arch.

The new well is Pan American Petroleum Corp. and Ard Drilling Co. 13 Masterson, in Section 152, Block A, W. J. Montgomery Survey. On completion test the well flowed gas at the rate of 7 M.M.c.f.d., with condensate at the rate of 273 bbl. daily.

Pay section is the Mazda-Finley reef (Pennsylvanian Strawn), through perforations at 5,275-5,350 ft. Total depth was 6,260 ft., plugged back to 5,536 ft. Nearest big field to the discovery is Bateman Ranch, 13 miles to the southwest, which has Cisco and Strawn pays from 3,700-5,300 ft.

Pan American and Ard Drilling share equal interest in the well and about 3,000 acres surrounding it.

Pan American and Ard Drilling Co.'s gas-condensate discovery is shown in the map above. Heavy broken line crossing the northern half of the county outlines the eastern end of the Matador arch.

Garza discovery makes heavy Ellenburger flow

A DUAL OIL DISCOVERY was assured for southern Garza County at General American Oil Co. of Texas 1 Susie Konnsman. Operators drilled into the Ellenburger at 8,175 ft., after indicating production from the Strawn between 7,680-7,967 ft.

On test in the Ellenburger between 8,175-95 ft., total depth, the well flowed 167 bbl. of 39°-gravity oil in 12 hours through 8/64-in. choke. Gas-oil ratio was 242:1.

Another gage reported was 43 bbl. of oil an hour through 5/8-in. bottom-hole and 1-in. top chokes. Flowing pressure on the latter gage ranged from 640-2,000 psi. Shut-in tubing pressure was 3,675 psi. These tests were without acid treatment.

After acidizing with 500 gal., the well gaged 24 bbl. of oil in 30 minutes through ½-in. choke, for a daily rate of 1,152 bbl.; then 17 bbl. in 30 minutes through ¼-in., and when changed to ⅛-in. choke, the flow was 6 bbl. in 30 minutes.

General American's well is located in the SW SW Section 5, Block 2, T&NO Survey. It is ½ mile south of an 8,305-ft. dry hole and about 2 miles southeast of the Happy field area.

Further exploration . . . Shell Oil Co. has filed application to drill an 8,600-ft. wildcat in Garza County, 13 miles south of Post. Their 1-G Slaughter will be located on a 197-acre lease in J. J. Koonsman Survey 3, A-1162. It is 2 miles south of Strawn and Ellenburger production in the Happy field, and slightly more than 2 miles west of General American 1 Koonsman.

Here's drilling action in . . .

New Mexico

GENERAL Crude Oil Co. and Sunray Mid-Continent Oil Co. have staked location for a 7,500-ft. test in a remote wildcat area of eastern New Mexico.

Location is in 14-10n-24e, about 15 miles northeast of Santa Rosa, in Guadalupe County.

In adjoining San Miguel County, Miami Petroleum Co., Inc., is drilling below 1,100 ft. in the 2 Bell Ranch. The test is projected to 6,500 ft. or granite. Location is in the center of SE NW 12-14n-27e.

The same company has abandoned its 2 Hoover Ranch northwest of Tucumcari in San Miguel County. A slight show was reported in granite wash at 6,475-6,505 ft. Total depth was 7,077 ft.

. . . Texas Panhandle

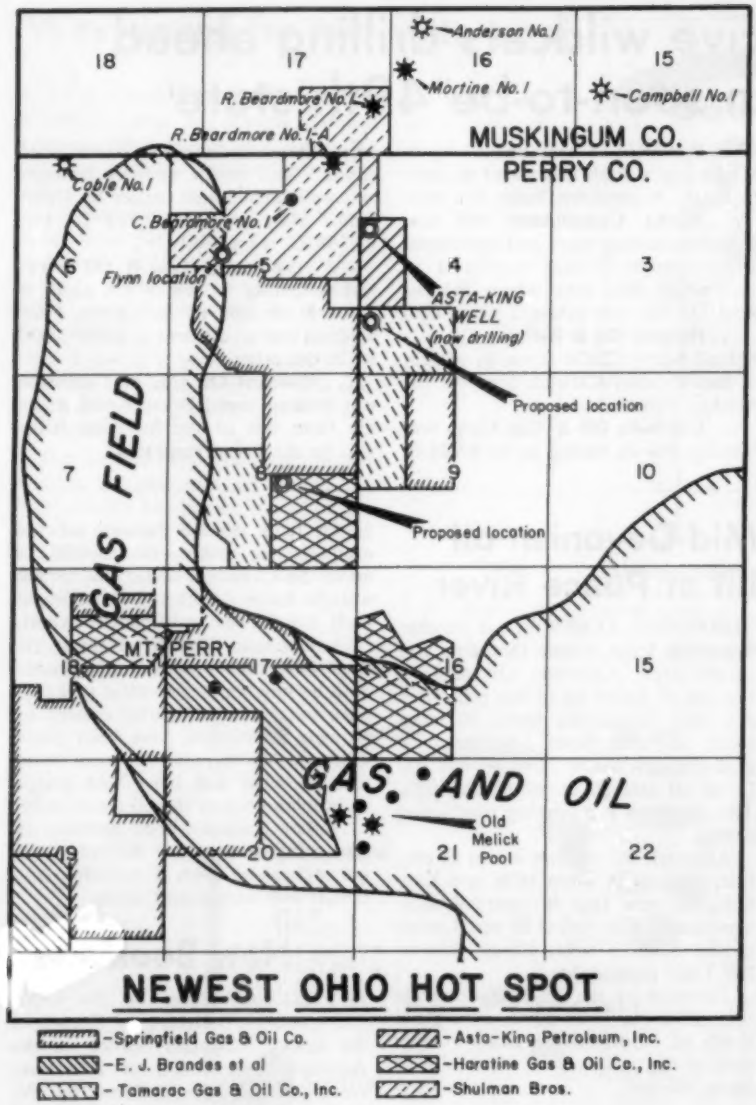
Upper Morrow oil production was opened at a wildcat in southwestern Ochiltree County, Texas Panhandle, by Sinclair Oil & Gas Co.

The 1 G. F. Buzzard, 10 miles southeast of the town of Waka, flowed 423 bbl. of oil per day on ¾-in. choke from perforations at 8,337-40 ft. The well spots in Section 75, Block 13, T&NO Survey. Nearest production is 3 miles west at RHF-Morrow field.

. . . and Kansas

A new Chester-Mississippian oil find in southwestern Kansas is nearing final testing stage. It is W. J. Coppinger's 1 Collingwood in C NW SE 8-28s-3e. Pump is being placed at the well, a Haskell County discovery.

During swabbing operations the well got 13¼ bbl. of oil per hour during a 3-hour period. Perforations are at 5,433-45 ft.



Clinton successes draw drillers to Ohio's Perry County

RECENT successful Clinton tests in an area 2½ miles north of the old Melick pool in Madison Township, Perry County, Ohio, have created much interest, with five independent operators drilling or making locations.

In December 1957 Shulman Brothers completed 1 Anderson State Permit No. 1532, which gaged 504 M.c.f. of gas after fracture.

In February 1958 Shulman completed 1 Campbell State Permit No. 1544, which gaged 2,740 M.c.f. of gas after fracture.

On February 27, 1958, Shulman completed 1 Coble State Permit No. 1903, which gaged 2,658 M.c.f. of gas after fracture.

On April 7, 1958, Shulman completed 1 Mortine State Permit No. 1552, which gaged 1,225 M.c.f. of gas and 40 bbl. of oil after fracture.

On June 2, 1958, Shulman completed 1 Roy Beardmore State Permit No. 1651, which gaged 600 M.c.f. of gas and 110 bbl. of oil after fracture.

On July 18, 1958, Shulman completed 1-A Roy Beardmore State Permit No. 1925, which gaged 3,215 M.c.f. of gas and 5 bbl. of oil natural.

Permit No. 1936 was issued on August 8, 1958, for a well to be drilled on the Charles Beardmore farm.

In March 1958, Elgin J. Brandes completed a well on the Charles Sode farm which made 15 bbl. of oil after fracture. Brandes is currently completing a well on the McCullough-Wilkins lease to the west of the Sode well.

Asta-King Petroleum, Inc., of Conneaut, Ohio, is currently drilling a well on the Kroft farm which adjoins the Charles Beardmore lease. Drilling is currently at 1,400 ft.

Tamarac Gas & Oil Co. of Zanesville, Ohio, is now making location ½ mile south of the Asta-King location.

The Haratine Gas & Oil Co. of Camp Hill, Pa., is making location 1½ miles south of 1 Charles Beardmore.

Springfield Gas & Oil Co., headed by John A. McGuire who drilled the fabulous "Fickle Fanny" well in the Leidy field in Clinton County, Pennsylvania, holds several large blocks in the area and is planning several operations to begin in the near future.

East Texas drilling picked up in August

EAST TEXAS gained four new fields —one oil and three gas—during August, according to the Texas Railroad Commission's monthly recap of developments.

The four field openers were scattered over as many counties. The oil discovery was a new-pay zone in Marion County, while Cherokee, Cass and Leon counties got the new gas reservoirs.

Drilling also increased during the month, according to the commission's figures. Total wells completed was 98, of which 47 were oil, 12 gas and 39 dry holes. Locations staked during the month were for 42 wildcats and 85 in producing field areas.

Marion County . . . Amerada Petroleum Corp. and Wiggins Bros. 1 Braden opened Travis Peak oil production 6 miles east of Smithland in the Marion County Shallow field. Completion was for 89 bbl. of 46.8°-gravity oil a day flowing through 17/64-in. choke. Pay perforations were at 6,454-67 ft. Flowing tubing pressure was 700 psi., with gas-oil ratio of 6,517:1.

Cherokee County . . . Gibson Drilling Co. and Associates 1 Henry Hall opened wet-gas production from the Woodbine 2 miles west of Jacksonville townsite. Initial production was 1,500 M.c.f.d. of gas, plus an esti-

mated 7 bbl. of condensate per 1 M.M.c.f. Producing perforations were at 4,857-59 ft. Other data included gas-condensate ratio of 142,900:1, 58.5° gravity, and rock pressure of 2,992 psi.

Cass County . . . Humble Oil & Refining Co. 1 Emma Walter, 2 miles north of Bloomburg townsite, opened the Bloomburg field with a gas flow of 1,600 M.c.f.d. Pay was the Smackover limestone at 10,380-90 ft. Condensate yield was 23 bbl. of 46.9°-gravity per 1 M.M.c.f., for a gas-liquid ratio of 41,667:1.

Leon County . . . E. A. Carter and B. A. Kaemmerer and Associates opened the largest of the gas wells. Initial production was 44 M.M.c.f.d. of gas, calculated open-flow, plus an estimated 5 bbl. of condensate, from the Woodbine at 5,808-21 ft. Location is in the northeastern portion of the county, about 6 miles southeast of Oakwood.

Oklahoma gas found in Harper . . .

PAN AMERICAN Petroleum Corp. has completed a gas wildcat well in Harper County, Oklahoma, for gas recovery at the rate of 3.33 M.M.c.f.d.

Pan American-Ohio Oil Co. No. 1-A Barby Unit, located in Section 23-T27n-R26w, flowed on the production test from the Chester, through perforations at 6,780-86 ft. Operator is continuing to test.

The Chester was topped at 6,724 ft., and the well was drilled to a total depth of 7,014 ft., plugged back to 6,804 ft. Nearest Chester production is at the Laverne field, about 3 miles southeast of 1-A Barby Unit.

Pan American has 75% interest in the well and 640 acres surrounding it. Ohio holds 25% interest. In addition to this acreage, Pan American owns full interest in an additional 1,500 acres in the area.

and Major County

Dual completion was reported at an important new gas find in northwestern Oklahoma's Major County.

Pan American Petroleum Corp. 1 Hutchinson Unit "B," C NE SW 32-22n-15w, 3 miles southeast of South Campbell field, flowed 1,020 M.c.f.d. of gas on 1-in. choke from Chester-Mississippian perforations at 7,367-79 ft.; 186 M.c.f.d. on ¼-in. choke from the Cherokee-Pennsylvanian at 7,146-48 ft.

Five wildcats drilling ahead in soon-to-be 49th state

FIVE WILDCATS were under way in Alaska and a sixth was slated to start up soon. A rundown looks like this:

. . . Alaska Consolidated Oil Co. was rehabilitating roads and equipment preparatory to drilling a wildcat in the Iniskin Bay area where Havenstrite Oil Co. was activ~ 2 years ago.

. . . Humble Oil & Refining Co. was drilling below 12,050 ft. on its wildcat in the Widebay-Kanatak area on the Alaskan Peninsula.

. . . Colorado Oil & Gas Corp. was running 9⅝-in. casing in its 8,984-ft. deep wildcat in the Cape Fairweather region. This test is midway between two wells abandoned earlier by Colorado. They went to 9,314 ft. and 11,765 ft. respectively.

. . . Anchorage Gas & Oil Corp. was preparing to test a gas sand at 1,800 ft. in one of its Susitna Flats wildcats and an oil sand at 2,700-3,000 ft. in the other.

. . . Standard Oil Co. of California was drilling ahead below 8,600 ft. on the third test of the Swanson River unit on the Kenai Peninsula.

Mid-Devonian oil hit at Peace River

NORTHERN ALBERTA has another Beaverhill Lake-Middle Devonian discovery area. Colorado Oil & Gas, Ltd., et al, found oil in this renowned pay near Girouxville town, 30 miles south of Peace River. Recovery on drill-stem test below 7,890 ft. was 100 ft. of oil and 50 ft. of oil-cut mud. The operators are running production casing.

Although the oil flow is not as prolific as those in Swan Hills and Kaybob, the new find is regarded most significant. The well is 80 miles north of the Kaybob field, closest Beaverhill Lake production.

Location of the 16-17 Girouxville is on LSD 16, 17-77-22w5, 10½ miles south of Normandville field. Further tests at this well will be watched with keen interest.

Oil's impact on Alberta told in new book

"Dynamic Decade" is the title of a recently published book which clearly unfolds the profound and extensive changes to Alberta's economy since the famous oil discovery at Leduc in 1946. It traces the far-reaching consequences for all of Canada created by oil development.

Author Eric J. Hanson is associate professor of economics at the University of Alberta.

From a "have-not" province with little industry and a static population, Alberta has become one of the wealthiest parts of the country with an ever increasing population and rising revenues derived either directly or indirectly from the expanding oil industry. Foreign investment in Canada's natural resources—much of it drawn from abroad because of the dramatic oil strikes—has helped to make the Canadian dollar one of the world's hardest currencies, while oil itself has become a Canadian export.

In Dynamic Decade, Hanson relates how other industries, attracted both by new and economical fuel supplies and the larger market created by growing population, have been established in Alberta, and how new towns rose on what had been bald prairie or bushland before the oil crews came.

Author Hanson's book provides an interesting history of the west's oil industry along with a valuable economic and sociological study.

New Books

A PACKAGE offer of the 1955, 1956, and 1958 Geological Record of the Rocky Mountain Section of the American Association of Petroleum Geologists is being offered by Petroleum Information, 1640 Grant Street, Denver. The books contain papers presented at the annual meetings of the Rocky Mountain section of the AAPG.

With interest in the Rocky Mountains' oil future rising rapidly each month, these books will be valuable additions to oil libraries everywhere. The books are well illustrated, well presented, and contain a large variety of information on Rocky Mountain geology, tectonics, and producing areas.

Kansas field has new pay

The Marmaton-Pennsylvanian is a new pay for southwestern Kansas' Massoni field, Seward County.

Cabot Carbon Corp. completed 1 Nellie Burr in C SE NW 4-33-31 flowing 171 bbl. of oil daily from perforations at 5,031-41 ft.

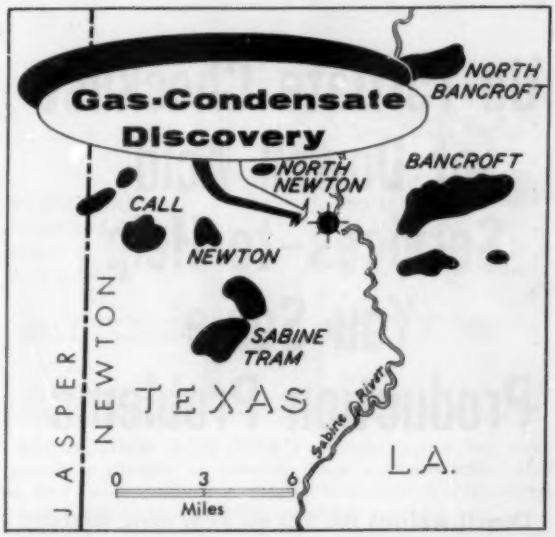
Way opens for two-state pool

A NEW-FIELD DISCOVERY by Oil Reserves Corp. in eastern Newton County, Texas Gulf Coast, opens the way for another two-state producing area.

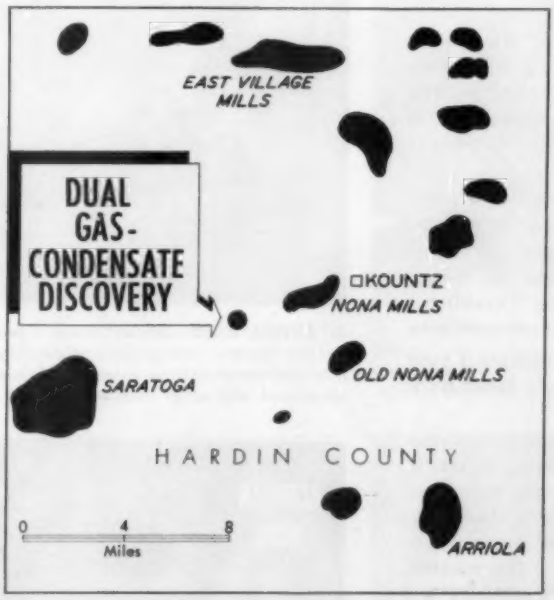
The new discovery well, 3-K Kirby-Runnels, is just inside the state line (Sabine River) from Louisiana, where nearest production is in Bancroft field, about 3 miles east in Beauregard Parish.

In Texas it is about 3 miles south and east of North Newton field and about the same distance east of Newton field.

The well is rated good for 16,100 M.c.f.d. of gas with 78.45 bbl. of 67.8°-gravity condensate per M.M.c.f. Flowing pressure through ¼-in. choke is 2,375 psi. Production is from casing perforated interval at 7,640-42 ft. Total depth is 8,350 ft.



GAS-CONDENSATE PRODUCTION was tapped near the Louisiana line at a Newton County wildcat drilled by Oil Reserves Corp.



HARDIN COUNTY has new gas-condensate production of a Texas Gas Exploration Corp. wildcat.

Texas Eocene trend adds field

A NEW gas-condensate discovery well 5 miles west of Kountze, in Hardin County, Texas Gulf Coast, has been completed by Texas Gas Exploration Corp., of Houston.

It is productive from two Eocene sands, one perforated at 8,472-92 ft., and the other at 8,638-58 ft.

The upper zone is rated good for 18 M.M.c.f.d. of gas open flow. It tested 2,721 M.c.f. of gas with 46.08 bbl. of condensate per day through adjustable choke. Flowing pressure is 2,573 psi.

The low zone flowed 990 M.c.f. of gas and 1.39 bbl. of condensate per day through 7/32-in. choke under pressure of 2,269 psi. Open-flow potential is 1,660 M.c.f.d.

The well, 1 Nona Fletcher, is about 2 miles southwest of Nona field, nearest production.

Redrilled Calgary area well completed

PROLIFIC GAS PRODUCTION was tapped by Shell Oil Co. of Canada, Ltd., at B11-34 Crossfield, LSD 11, 34-27-2w5, near Calgary.

The well is a rework, having been capped for the past 2 years since its original discovery. Shell's Crossfield well, 20 miles north of the city, made 160 M.M.c.f.d. of gas and 26 bbl. of condensate per million cubic feet of gas on calculated open flow potential.

Michigan strike may boost drilling

PRELIMINARY production tests on W. L. Harvey 1 State, SW NE SW 10-22n-1e, Ogemaw County, showed flow recovery of 42 to 51 bbl. oil per day from Richfield section, perforated at 4,303-65 ft.

Tests followed 3,500-gal. acid treatment. Located 2 miles northwest of the old West Branch field, the new wildcat is expected to stimulate a modest development campaign before the end of the year.

Sun Oil Co. 1 Desgrandchamp, NW SW NE 22-4n-15e, Casco Township, St. Clair County, flowed 10 bbl. oil per hour net from Niagaran reef pay at 2,528 to 2,679 ft. following fracture of 31,710 gal. oil and 20,000 lb. sand. Well is a northeast offset to a previously drilled reef well.

Up-To-Date Checklist of Dowell Acid Services–to Help You Solve Production Problems

Dowell acidized the first oil well, using inhibited hydrochloric acid, in 1932. Since then, Dowell engineers have encountered thousands of well stimulation problems where acid—properly modified and applied—proved to be the best method of increasing production. This experience has led to the development of a wide variety of improved acids, techniques and addition agents.

For example, Dowell has developed two acids with retarded action for wells producing from fast-reacting limestone pays. These acids are especially effective in vugular and oolitic formations; and in formations containing natural fractures, or exhibiting inter-crystalline porosity.

Where the producing formation is a dense slow-acting dolomite, wells often respond better to acid treatment if a Dowell intensifying agent is added.

Emulsions and silicate swelling need no longer restrict production following an acid job. Dowell has developed addition agents to combat these problems.

There is no need to rule out acid treatments if your well is producing from a sandstone. Many sands show good solubility in Mud Acid.

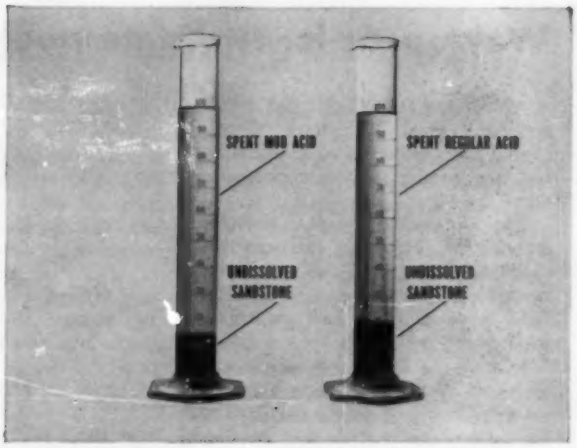
The search for improved chemicals and new acidizing techniques continues today at Dowell. Recently, Dowell worked with operators in the Mid-Continent and Permian Basin areas to perfect the use of magnesium pellets to heat acid, as the acid is pumped into producing formations. By creating heat in this manner, Dowell has been able to remove scale and deposits unaffected by other treatments.

When you specify Dowell you get the benefit of more years of experience in oil well acidizing than you can get from any other service company.

Dowell's major acid services are briefly described at the right. For service, call any of the 165 Dowell service points and offices. In Canada, contact Dowell of Canada, Ltd.; in Venezuela, contact United Oilwell Service. Or write Dowell, Tulsa 1, Oklahoma.

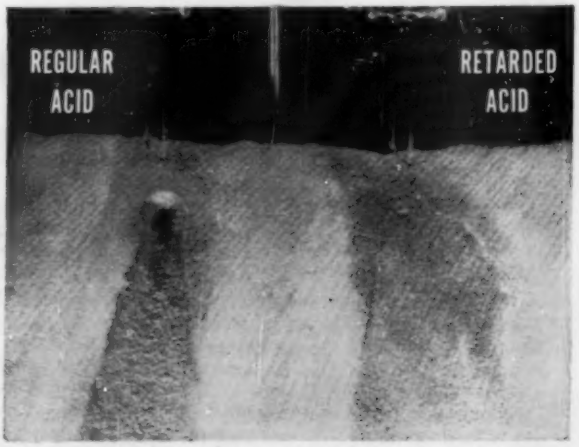
Services for the oil industry DOWELL

A SERVICE DIVISION OF THE DOW CHEMICAL COMPANY

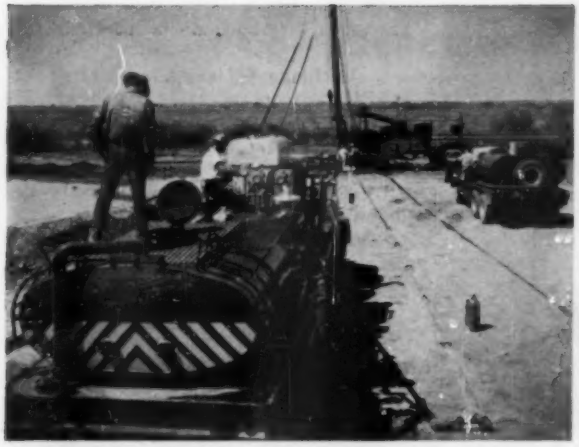


1. MUD ACID contains a special fluoride compound designed to help dissolve and disintegrate clays and bentonites. It is recommended for use in mud removal operations and for acidizing certain sandstone formations.

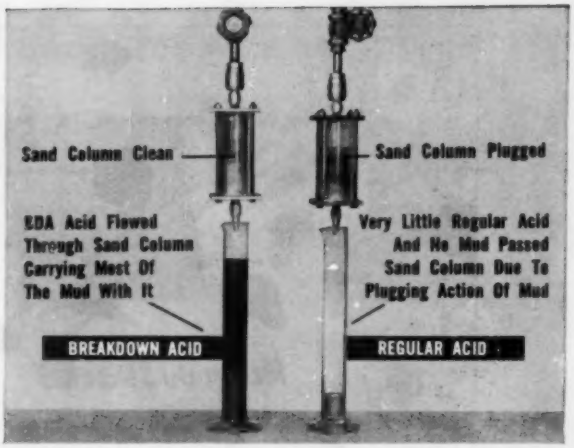
4. XFWM ACID contains three agents designed to reduce surface tension, reduce silicate swelling and prevent emulsions. It is commonly used as a service by itself; but is also used as a spearhead with other treatments.



7. RETARDED ACID contains an addition agent that greatly slows down the acid action—as shown here. It is designed to create a deeper drainage area in fast-reacting limestone formations than does regular acid.

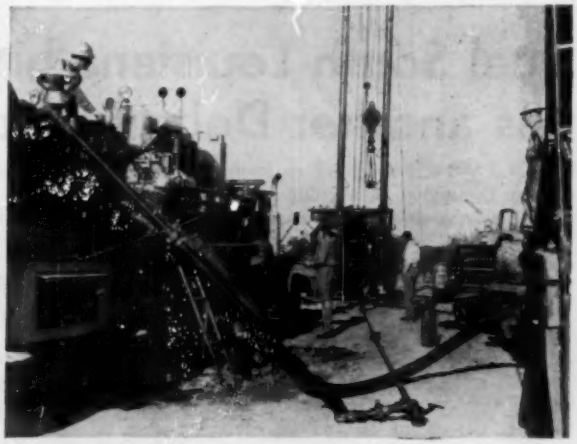


2. DOWELL REGULAR ACID is the basis for Dowell acidizing services. It is a 15 per cent by weight inhibited hydrochloric acid solution. One thousand gallons of regular Dowell acid will dissolve 10.8 cubic feet of pure limestone.


Sand Column Clean
Sand Column Plugged
BDA Acid Flowed Through Sand Column Carrying Most Of The Mud With It
Very Little Regular Acid And No Mud Passed Sand Column Due To Plugging Action Of Mud
BREAKDOWN ACID
REGULAR ACID

3. BREAKDOWN ACID (BDA*) contains agents that make it especially effective in breaking down and penetrating mud cake, and the formation. It is designed to be used as a spearhead for both fracturing and acidizing treatments.

5. SILICATE CONTROL ACID contains an agent designed to control the swelling of certain silicates, clays and bentonites. It is also effective in preventing or breaking oil-in-water emulsions that sometimes occur following an acid treatment.

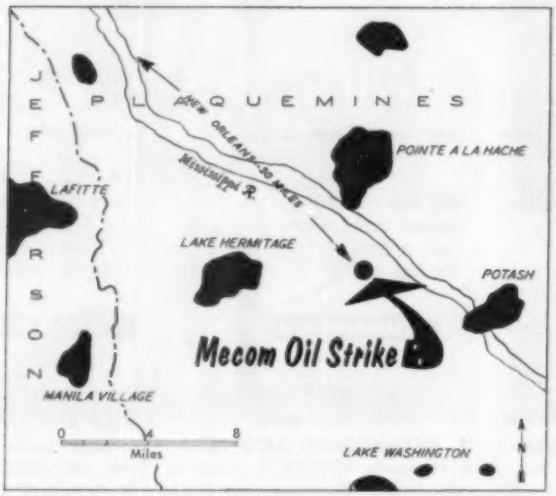


6. HEATBLAST is a new Dowell service designed to remove heavy hydrocarbons and mineral scales near the well bore by increasing the bottom hole temperature of the well. It uses a jel solution carrying magnesium pellets and a specially inhibited acid.

8. ACID PETROFRAC* is a Dowell fracturing service that uses an acid-oil emulsion as the fracturing fluid. This fluid, however, is often used on highly soluble formations—without sand—as a retarded acid.

9. STABILIZED ACID is designed to prevent the precipitation of iron hydroxide from spent acid. It is widely used to acidize waterflood input wells. It has also proved helpful in producing wells where iron salts are present.

*Dowell Trademark



ARROW points to location in Plaquemines Parish of new oil and gas-condensate discovery by J. Mecom and E. Cockrell.

Dual South Louisiana hit fills another Delta breach

PLAQUEMINES PARISH in southeastern Louisiana, is keeping up its steady succession of discoveries with the opening of a new oil and gas-condensate field about 30 miles down the Mississippi River from New Orleans.

Discovery well, 2 Vaccaro, drilled by John W. Mecom and E. Cockrell, Jr., is on the west bank of the river about 3 miles south of Pointe A La Hache field, nearest production.

It is completed in two Miocene sands, one perforated at 10,804-14 ft., and the other at 11,739-45 ft. Total drilled depth is 12,622 ft. Flow from the upper zone is rated at 1,900 M.c.f. of gas and 52 bbl. of 55.9°-gravity condensate per day. The lower zone tested 161 bbl. of condensate with 1,550 M.c.f.d. of gas.

Location also is about 5 miles east of Lake Hermitage field, and about the same distance up the river from Potash field.

North Tejon gap closed with midway discovery

DRILLING in southern San Joaquin Valley continues to hold the spotlight in California.

The North Tejon area dominates the Valley's activities.

Reserve Oil & Gas Co. closed the 1-mile between the Highway area of North Tejon field and the Main area with an extension almost midway between the two reporting a big test on an interval at 11,530-11,807 ft. The well, 348-18 Butler-Wehr, flowed at the rate of 1,190 bbl. daily through a 22/64-in. choke. A 3,036 ft. mud cushion surfaced in 43 minutes. Oil followed in 15 minutes from the Miocene Z-3 zone. Reserve was drilling ahead to take a look at the Z-4 zone, one of the most productive zones elsewhere in the field.

This field takes on more promise with virtually every well. The above extension, when it is completed, will almost assure the field of being at least 2 miles long, from east to west, with connection of the Highway and Main areas a virtual certainty.

The depths released by Reserve indicate its 348-18 Butler-Wehr's producing zones are related to the Main area ¼ mile to the east instead of to the Highway area ½ mile to the west.

Thus far, the field shapes up as being fairly narrow, running about five locations wide at this point. The east-west limits are still undetermined, with some estimates that it could run 5 or 6 miles long.

Drilling in the field looks like this:

... Reserve was drilling below 9,466 ft. on 338-17 "BW-SP" an easterly extension test ¼ mile from the nearest Main area producer.

... Reserve was drilling below 9,340 ft. on 302-19 "W-T," an eastern offset to production in the Highway area.

... Richfield Oil Corp. was coring below 9,863 ft. on 41-24 "KCL I," the most westerly extension effort yet in the Highway area. It is about ½ mile from the pool discovery well.

... Richfield was opening and conditioning hole to test at 10,900 ft. a south extension try to the Highway area. This well will reportedly be a deeper Eocene test.

Second operator to drill at San Emidio

Bandini Petroleum Co. and Hamilton Dome Co., Inc., have staked a location about 1¼ miles north of Richfield's recently completed first stepout in the San Emidio Nose field. This puts the Bandini wildcat a little more than 2 miles north of the field discovery. Projected total depth is 12,500 ft.

In addition to Richfield and the Bandini-Hamilton duo, other companies with substantial holdings in the area include Intex Oil Co., Continental Oil Co., Shell Oil Co., and Standard Oil Co. of California.

Ocean probe begins at Santa Barbara

Standard Oil Co. of California, Western Operations, Inc., became the first company to start operations on the offshore parcels awarded recently off Santa Barbara County.

Standard put the Pacific Driller No. 1, the West Coast's first Gulf-type drilling platform, to work on a location 3,800 ft. offshore from parcel C, the center parcel of the 5 that originally went up for bidding. Standard and Humble Oil & Refining Co. landed the 3,840-acre parcel for a cash-bonus bid of $12,423,598.

Second Los Angeles Country Club wildcat under way

Hudson Gas & Oil Corp. was drilling below 611 ft. on 2 L. A. Country Club, its second test of the exclusive Los Angeles Country Club in West Los Angeles bordering the 20th Century Fox movie lot.

Gas strike in Ohio

John E. Lydle et al 1 Michael Zolner, a stepout southwest of Holmesville in Section 9, Prairie Township, Holmes County, was reported by the operators as gaging 830, M.c.f. natural and 3,780 M.c.f. after fracturing Clinton at 3,245-58 ft.

Service, condensate well depth breakdown, August

	Service wells					Field condensate							Wildcat condensate				
	A	B	C	D	E	C	D	E	F	G	H	I	D	E	F	G	H
California					1												
Indiana		1															
Kansas			5					1									
Kentucky		1															
Louisiana								1	5	12	4	2				1	2
South								1	3	6	3	2				1	2
Offshore									2	6	1						
Mississippi							1		2								
Michigan	1	1															
New Mexico								1	1		1			1			
West														1			
East								1	1		1						
New York		20															
Ohio		5	1														
Oklahoma	5	9	7	1		6	1	2	1					1	2		
Pennsylvania	1	15															
Texas	2	7	6	3	1	1	1	15	15	11			1	2	3	2	1
District 1									1	1							
District 2				1				3	1								
District 3									4	4					1	1	1
District 4									4	3				1	2		
East						1	1	8						1		1	
District 7-B	1				1								1				
West		3						3	1	3							
District 10			3					1									
District 9	1	4	3	2					4								
West Virginia		1															
Total United States	**9**	**60**	**19**	**4**	**3**	7	3	20	24	23	5	2	1	4	5	3	3

Canadian papers slated for SEG meet

THREE important papers on geophysical techniques in Western Canada will be presented at the 28th annual international meeting of the Society of Exploration Geophysicists in San Antonio October 13-16.

G. J. Blundun, chief geophysicist, Home Oil Co. of Calgary, Alta., will deliver "The Mississippian in the Alberta Plains and the Reflection Seismograph." "Regional Gravity Studies in the Alberta Plains and Mountains" will be presented by Dr. G. D. Garland, associate professor of geophysics at the University of Alberta, Edmonton, Alta.

"Correction of Seismic Time Maps for Lateral Variation in Velocity Beneath the Low Velocity Layer" is the topic of C. H. Acheson, staff geophysicist, Imperial Oil, Ltd,, Calgary.

Blundun, past president of the Canadian Society of Exploration Geophysicists, will discuss the development of a technique of mapping the top of the eroded Mississippian surface in the Province of Alberta, with examples taken from the Harmattan area, now an oil field, producing from the Elkton member of the Mississippian. It is not a case history of the field. The occurrence of specific seismic-geologic correlations and their use as a criteria for detection of eroded Mississippian highs, will be illustrated.

Dr. Garland's paper concerns the regional gravity field of the Alberta plains, foothills, and mountains, which may be interpreted with some certainty, partly because of a number of wells to basement, which indicate the depth and nature of the covered Precambrian shield at scattered points.

It is shown that the major anomaly trends can be explained by basement lithology, and there is a strong suggestion that a single province of the Precambrian shield, the Churchill, extends beneath the foothills and Rocky Mountains, at least as far west as Banff.

Acheson's paper deals with a well drilled several years ago on a seismic high near Calgary, which encountered a deep structural low. The problem caused by this inverse relationship between seismic anomaly and structure, stimulated an intensive study of near-surface velocities in a small area, which led to the discovery that spurious effects can be introduced by lateral variations in velocity beneath the low-velocity layer. These can be minimized by correcting the maps to a deep datum. The study of this correction technique has continued to the present time.

Successful Wildcats

ALBERTA

Canadian Chieftain 6-11-36-6 Provost, LSD 6, 11-35-6w4. Viking oil discovery. TD 3,151 ft.

Pan American A-1 Woking, LSD 10, 25-75-5w6. Indicated Cadotte gas discovery. TD 6,753 ft.

Phillips 9-5-15-4 Plateau, LSD 9, 5-15-4w5. Mississippian gas discovery. TD 9,304 ft.

Union Oil Co. 4-20-88-8 Red Earth Creek, LSD 4, 20-88-8w5. Slave Point-Middle Devonian oil discovery in Granite Wash field. TD 4,875 ft.

CALIFORNIA

Los Angeles County: Humble Oil & Refining Co. 1 Mabel E. Strawn, SE SE 3-4n-17w, 277 BOPD, 18° gravity, 4% cut, perfs. 5,573-98 ft., 5,612-77 ft., and 5,692-5,800 ft., TD 6,722 ft. (New field discovery 1½ miles south of Castiac Hills field.)

SOUTH LOUISIANA

Acadia Parish: American Natural Gas Producing Co. 2-A Desormeaux, 23-10s-2w. IP 19 BOPD and 750 M.c.f.d., ⅞-in., 56.3°, TP 3,100 psi., perforations 9,588-98 ft. TD 10,167 ft. (New pay in Southwest Mermentau field.)

California Co. 1 Mouton, 3-9s-3e. IP 46 BOPD and 2,300 M.c.f.d., ⅞-in., 51.2°, TP 3,500 psi., perforations 9,605-22 ft. TD 11,100 ft. (New pay in South Bosco field.)

Beauregard Parish: Sunray Mid-Continent Oil Co. 3-B Lutcher-Moore, 30-7s-11w. IP 126 BOPD and 1,800 M.c.f.d., 9/64-in., 50.8°, TP 4,650 psi., perforations 8,988-9,003 ft. TD 9,585 ft. (Second

Total August completions, exploration and development

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	8	5	0	0	3	0	61,636	3	0	0	0	3	3,966	0	17
Alaska	1	0	0	0	1	0	14,221	1	0	0	0	1	14,221	0	3
Arizona	2	0	0	0	2	0	8,166	2	0	0	0	2	8,166	1	8
Arkansas	92	56	0	3	33	0	278,161	14	1	0	1	12	55,026	0	110
California	96	53	0	4	37	2	573,243	29	3	0	2	24	166,334	2	145
Colorado	83	15	0	6	62	0	430,673	55	3	0	3	49	287,149	0	100
Florida	1	0	0	0	1	0	6,915	1	0	0	0	1	6,915	0	2
Illinois	190	84	0	3	103	0	438,082	35	1	0	0	34	74,125	11	370
Indiana	58	16	0	0	41	1	96,201	20	4	0	0	16	30,332	45	104
Kansas	284	110	1	20	148	5	986,285	73	9	0	3	61	273,622	9	437
Kentucky	112	38	0	17	56	1	169,307	14	1	0	1	12	16,702	90	152
Louisiana	324	131	27	12	154	0	2,396,341	59	2	3	1	53	427,814	0	438
North	132	48	0	11	73	0	507,116	38	1	0	1	36	185,723	0	179
South	150	66	18	1	65	0	1,500,526	18	1	3	0	14	210,119	0	217
Offshore	42	17	9	0	16	0	388,699	3	0	0	0	3	31,972	0	42
Michigan	29	9	0	2	16	2	71,092	9	0	0	0	9	27,469	14	101
Mississippi	27	12	3	0	12	0	245,468	8	0	0	0	8	73,161	0	54
Missouri	1	1	0	0	0	0	1,376	0	0	0	0	0	0	1	1
Montana	22	15	0	0	7	0	89,650	5	0	0	0	5	17,180	3	59
Nebraska	60	17	0	0	43	0	352,612	30	0	0	0	30	165,441	0	47
New Mexico	178	74	4	65	35	0	833,401	23	4	1	0	18	115,072	45	196
West	93	18	1	63	11	0	407,582	10	3	1	0	6	43,190	8	118
East	85	56	3	2	24	0	425,819	13	1	0	0	12	71,882	37	78
New York	51	21	0	5	5	20	87,977	5	0	0	0	5	19,843	51	41
North Dakota	34	21	0	0	13	0	214,297	8	0	0	0	8	41,775	0	52
Ohio	92	37	0	21	28	6	230,732	4	0	0	2	2	13,135	92	233
Oklahoma	443	220	13	21	167	22	1,371,143	53	3	3	3	44	220,821	101	728
Oregon	1	0	0	0	1	0	7,919	1	0	0	0	1	7,919	0	0
Pennsylvania	108	32	0	47	13	16	327,549	5	0	0	1	4	29,223	102	59
Texas	1,310	724	52	64	451	19	5,184,214	254	30	9	6	209	1,179,994	68	985
Dist. 1	77	32	2	1	42	0	164,892	28	0	0	0	28	74,598	0	36
Dist. 2	55	17	4	9	24	1	320,336	13	0	0	0	13	77,520	0	42
Dist. 3	84	20	11	2	51	0	551,983	23	2	3	1	17	192,918	0	77
Dist. 4	75	23	10	9	33	0	413,074	21	1	3	1	16	128,206	0	51
East	93	52	12	0	29	0	402,520	19	1	2	0	16	100,804	0	63
Dist. 7-B	194	82	1	4	105	2	533,762	54	8	1	2	43	173,326	0	78
West	352	271	7	4	67	3	1,693,938	46	11	0	1	34	231,402	28	462
Dist. 9	279	174	1	6	88	10	715,061	45	6	0	0	39	158,555	40	84
Dist. 10	101	53	4	29	12	3	388,648	5	1	0	1	3	42,665	0	92
Utah	25	15	0	1	9	0	144,031	9	0	0	1	8	51,396	0	54
West Virginia	74	12	0	44	17	1	187,638	1	0	0	0	1	3,400	74	115
Wyoming	57	24	0	8	25	0	305,930	18	0	0	0	18	101,876	2	125
Aug. 1958	3,763	1,742	100	343	1,483	95	15,114,260	739	61	16	24	638	3,432,077	711	4,736
July 1958	4,416	2,150	101	364	1,655	146	17,566,108	891	111	16	20	744	4,046,621	830	4,714
Cum. 1958	31,167	15,277	764	2,413	11,939	774	129,748,739	6,186	607	106	188	5,285	29,031,454	5,285	....
Cum. 1957	35,527	18,453	340	2,542	13,465	727	147,000,000	7,918	827	64	269	6,758	37,983,000	....	....

D.D. = 18: Calif. 1, Ill. 1, Okla. 11, Wyo. 3, Ind. 1, Texas (4) 1.

. . . and in Western Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1958	Total	Oil	Gas	Dry	Footage	Cum. 1958
Alberta	157	101	16	24	16	843,854	1,083	21	3	3	15	110,175	288
Saskatchewan	76	51	1	24	0	340,756	486	23	4	1	18	104,473	123
Manitoba	2	1	0	1	0	3,772	66	1	0	0	1	1,658	8
British Columbia	1	1	0	0	0	4,745	61	1	1	0	0	4,745	45
Northwest Territories	0	0	0	0	0	0	7	0	0	0	0	0	7
Western Canada	236	154	17	49	16	1,193,127	1,703	46	8	4	34	221,051	471

well and new pay in West DeQuincy field.)

Cameron Parish: Caroline Hunt Sands 2 Lacassine Co., 5-12s-4w. IP 88 BOPD and 2,200 M.c.f.d., ⅛-in., 44.2°, TP 7,600 psi., perforations 15,350-98 ft. TD 15,751 ft. (Extends Southeast Thornwell field.)

Evangeline Parish: Sun Oil Co. 1 Haas-Hirsch, 13-6s-2e. IP 144 BOPD and 92 M.c.f.d., 7/64-in., 32.1°, TP 1,275 psi., perforations 7,988-96 ft. TD 8,861 ft. (Discovery well East Basile field.)

Jefferson Davis Parish: Cyprus Oil Co. 1 LaBauve, 21-8s-4w. IP 318 BOPD and 1,665 M.c.f.d., ⅞-in., 53.5°, TP 4,400 psi., perforations 10,565-93 ft. TD 10,727 ft. (New field.)

Terrebonne Parish: Humble Oil & Refining Co. 1-B Lutcher-Moore, 24-16s-15e (2 miles south of Chacahoula field). IP 353 BOPD and 1,022 M.c.f.d., ⅛-in., 42.9°, TP 5,200 psi., perforations 12,664-74 ft., and (dual completion) 423 BOPD and 470 M.c.f.d., ⅛-in., 39.1°, TP 4,700 psi., perforations 12,504-10 ft. TD 15,128 ft. (Discovery well Donner field.)

California Co. 1 L.L.&E. 2, 7-22s-17e. IP 113 BOPD and 6,032 M.c.f.d., ¼-in., 47.4°, TP 3,900 psi., perforations 10,630-36 ft. TD 12,654 ft. (New field—2 miles southeast of Four Isle field.)

August footage analysis

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	57,670	.....	.....	.....	.....	.....	.....	.....	3,966
Alaska	.....	.....	.....	.....	.....	.....	.....	.....	14,221
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	8,166
Arkansas	137,082	.....	9,663	76,390	.....	8,446	.....	6,418	40,162
California	326,934	.....	14,147	51,924	13,904	23,184	.....	13,101	130,049
Colorado	66,327	.....	17,859	59,338	.....	16,275	.....	16,500	254,374
Florida	.....	.....	.....	.....	.....	.....	.....	.....	6,915
Illinois	196,501	.....	1,241	166,215	.....	552	.....	.....	73,573
Indiana	21,463	.....	.....	42,807	1,599	6,544	.....	.....	23,788
Kansas	325,005	5,956	73,011	292,747	15,944	31,292	.....	15,572	226,758
Kentucky	46,395	.....	43,090	61,440	1,680	1,870	.....	625	14,207
Louisiana	874,451	271,206	49,037	773,833	.....	21,182	36,386	4,813	365,433
North	130,154	.....	38,966	152,273	.....	5,982	.....	4,813	174,928
South	580,732	176,119	10,071	523,485	.....	15,200	36,386	.....	158,533
Offshore	163,565	95,087	.....	98,075	.....	.....	.....	.....	31,972
Michigan	22,882	.....	3,153	15,058	2,530	.....	.....	.....	27,469
Missouri	1,376	.....	.....	.....	.....	.....	.....	.....	.....
Mississippi	112,086	24,133	.....	36,088	.....	.....	.....	.....	73,161
Montana	63,674	.....	.....	8,796	.....	.....	.....	.....	17,180
Nebraska	103,818	.....	.....	83,353	.....	.....	.....	.....	165,441
New Mexico	334,726	28,624	283,471	71,508	.....	18,555	7,060	.....	89,457
West	75,698	.....	275,980	12,714	.....	13,488	7,060	.....	22,642
East	259,028	28,624	7,491	58,794	.....	5,067	.....	.....	66,815
New York	27,050	.....	14,034	.....	27,050	.....	.....	.....	19,843
North Dakota	149,677	.....	.....	22,845	.....	.....	.....	.....	41,775
Ohio	110,228	.....	54,218	40,582	12,569	.....	.....	7,210	5,925
Oklahoma	639,813	48,769	84,179	335,597	41,964	20,268	22,428	18,233	159,892
Oregon	.....	.....	.....	.....	.....	.....	.....	.....	7,919
Pennsylvania	52,926	.....	182,952	32,421	30,027	.....	.....	7,320	21,903
Texas	2,439,954	350,388	224,765	937,206	51,907	166,725	77,040	39,649	896,580
Dist. 1	47,171	18,701	1,092	23,330	.....	.....	.....	.....	74,598
Dist. 2	95,951	27,037	47,986	67,080	4,762	.....	.....	.....	77,520
Dist. 3	99,065	80,794	5,314	173,892	.....	17,983	32,130	6,370	136,435
Dist. 4	85,951	67,656	28,247	103,014	.....	7,536	23,499	2,718	94,453
East	180,800	57,103	.....	63,813	.....	6,838	17,091	.....	76,875
Dist. 7-B	179,473	.....	5,781	168,677	6,505	32,710	4,320	7,041	129,255
West	1,208,466	61,734	20,751	166,742	4,643	69,974	.....	14,700	146,728
Dist. 9	366,637	5,900	36,911	119,690	27,368	20,247	.....	.....	138,308
Dist. 10	176,440	31,463	78,683	50,968	8,429	11,437	.....	8,820	22,408
Utah	86,680	.....	.....	5,955	.....	.....	.....	5,181	46,215
West Virginia	26,892	.....	118,242	36,801	2,303	.....	.....	.....	3,400
Wyoming	118,254	.....	57,403	28,397	.....	.....	.....	.....	101,876
Total U. S.	**6,341,864**	**729,076**	**1,230,465**	**3,179,301**	**201,477**	**314,893**	**142,914**	**134,622**	**2,839,648**
Western Canada	750,434	.....	53,443	76,749	91,450	34,110	.....	21,218	165,723
Alberta	539,788	.....	53,443	48,998	91,450	14,689	.....	18,914	76,572
Saskatchewan	208,532	.....	.....	27,751	.....	14,676	.....	2,304	87,493
Manitoba	2,114	.....	.....	.....	.....	.....	.....	.....	1,658
British Columbia	.....	.....	.....	.....	.....	4,745	.....	.....	0

Shoreline Drilling Co. and American Natural Gas Co. 1 Continental Land & Fur Co., 21-17s-14e. IP 36 BOPD and 3,650 M.c.f.d., ¼-in., 47.9°, TP 5,500 psi., perforations 12,230-43 ft. TD 12,305 ft. (Discovery well Northeast Turtle Bayou field.)

MICHIGAN

Isabella County: McClure Oil Co. and C. W. Collin 1 Johnson, SE NE SW 32-13n-5w, Fremont Township, 2 miles north Home-Edmore gas field. IP 1,335 M.c.f. gas per day. Elev. 908, Brown lime 1,175 ft., Stray sand 1,263 ft., pays 1,264-66 ft.; 1,266-70 ft. TD 1,275 ft. (New gas pool.)

MISSISSIPPI

Franklin County: Pan American Petroleum Corp. 4-A U. S. A.-Jack Ewing, 14-5n-1e. IP 124 BOPD, 11/64-in., 39.7°, perfs. 6,407½ ft. (one shot), Wilcox-Baker sand. TD 6,933 ft. Elev. 250 ft., Wilcox 4,535 ft., Baker sand 6,406 ft., Minter sand 6,616 ft. (Discovery well Dry Bayou field.)

Lincoln County: Vasser & Howard-Radzewicz 1 Solomon, SE NE SW 27-5n-8e. IP 338 BOPD (net), 13% b.s. and w., 9/32-in., 39°, TP 380 psi., perfs. 10,810-43 ft. (lower Tuscaloosa). TD 10,979 ft. Elev. 450 ft., lower Tuscaloosa 10,698 ft. (Extends Little Creek and/or Sweetwater fields.)

OHIO

Coshocton County: F. E. Edwards et al 1 W. M. Mackwert, Lot 13, Keene Twp. Clinton sand 3,600-50 ft. IP 1,200 M.c.f.d. TD 3,751 ft.

SASKATCHEWAN

Imperial 2-34 Cantel, LSD 2, 34-5-34w1. Mission Canyon oil discovery. TD 4,040 ft.

Canpet Cree Mining et al 12-14 Moose Valley, LSD 12, 14-12-6w2. Mission Canyon oil discovery. TD 3,946 ft.

Highwood Vanalta 11-11 Eagle Hill, LSD 11, 11-31-21w3. Viking sand oil discovery. TD 2,215 ft.

TEXAS GULF COAST

Bee County: Coastal States Gas Producing Co. 1 Whitlow, A. P. Baker Sur. (11 miles east of Beeville). Shut-in gas well, no gage, perfs. 3,152-59 ft. (Frio). TD 4,513 ft. (New field.)

Brazoria County: Monsanto Chemical Co. 1 MacDonald, Joseph White Sur. (6 miles west of West Columbia). Absolute open-flow potential 27 M.M.c.f.d., GLR 54.3 M.c.f. per barrel, 50°, shut-in TP 4,880 psi., perfs. 9,922-34 ft. (lower Frio). TD 10,015 ft. (New pay in Flag Pond field.)

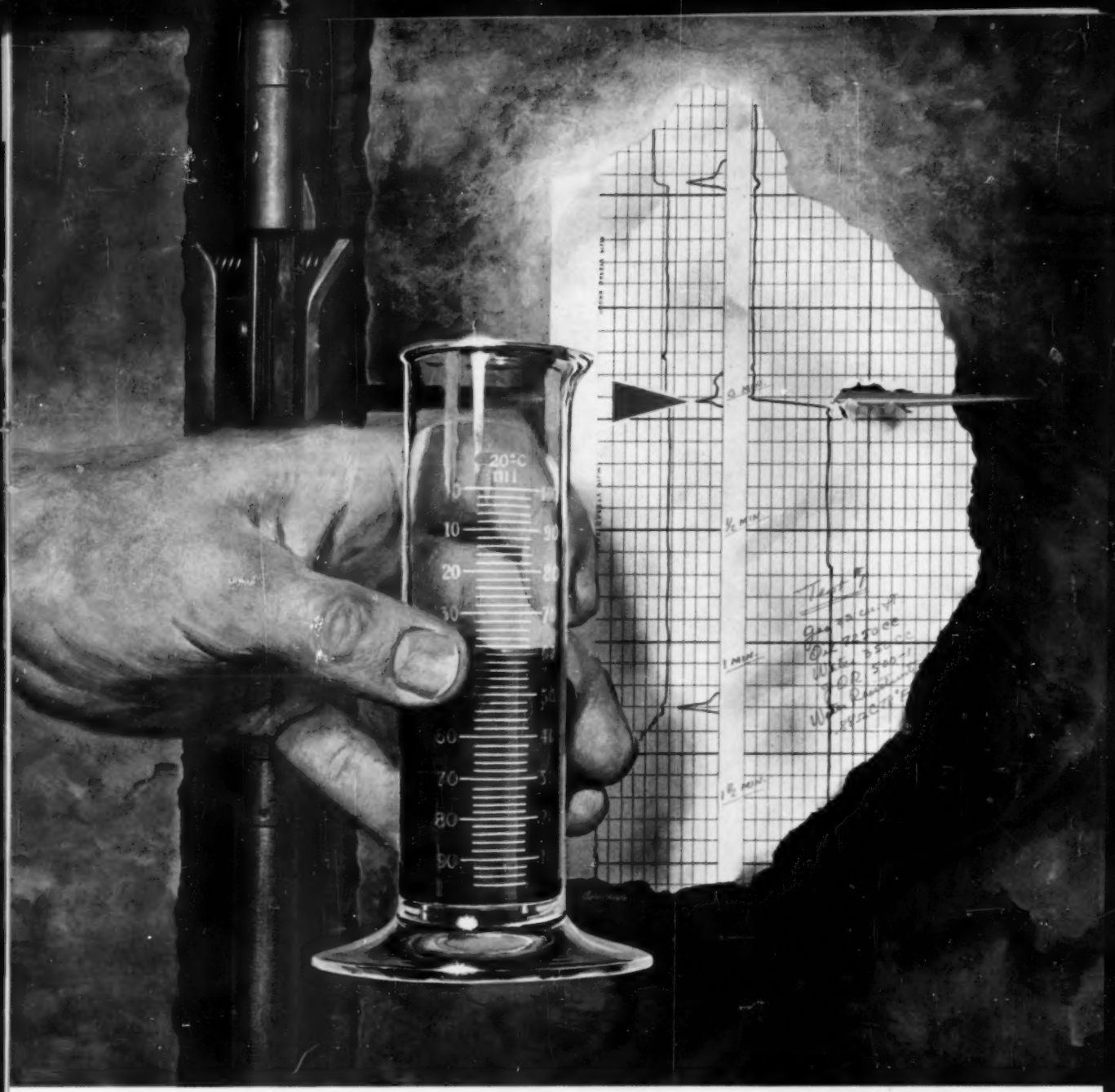
Cameron County: Texas Gulf Producing Co. 1 Vista Del Mar, Share 6, Protrero de San Martin Grant (9 miles east of Brownsville). Absolute open-flow potential 12 M.M.c.f.d. dry gas, shut in TP 2,801 psi., perfs. 7,414-26 ft. (Frio). TD 10,312 ft. (Gas discovery—Vista del Mar field.)

Chambers County: Wright-Pinner Oil Co. 1 Nelson, Charles Wilcox Sur. (1½ miles south of Anahauc). Absolute open-flow potential 62,400 cu. ft. daily, GLR

How August wildcats compared by depths

	OIL DISCOVERIES									GAS DISCOVERIES									DRY HOLES								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																			1	2							
Alaska																										1	
Arizona																					1	1					
Arkansas						1								1						1	8	3					
California				1	1			1				1			1				1	2	7	2	8	2		2	
Colorado				1	2								2	1					2	3	2	9	30	3			
Florida																							1				
Illinois	1																		4	18	11	1					
Indiana	1	3																	8	7	1						
Kansas		2	3	4									2	1					1	1	34	22	3				
Kentucky		1								1									5	7							
Louisiana					1				1				1						1	3	11	6	12	7	9	2	2
North					1								1						1	3	11	5	11	5			
South									1													1		2	8	1	2
Offshore																							1		1	1	
Michigan																				1	6	2					
Mississippi																							4		3	1	
Montana																			1		3		1				
Nebraska																					4	6	20				
New Mexico	1				3														2	1	4	5	3	1		2	
West	1				2														1	1		2	2				
East					1														1		4	3	1	1		2	
New York																					2	3					
North Dakota																					5	1		1	1		
Ohio												1	1							1		1					
Oklahoma				1	1	1							2		1				9	9	6	8	6	6			
Oregon																								1			
Pennsylvania														1									4				
Texas	1	2	4	7	8	5	3				1	1	1	1	1		1		11	54	34	35	49	25	1		
District 1																			6	7	9	3	3				
District 2																			1		1	2	5	4			
District 3						1	1							1						1			5	11			
District 4						1						1							2	1		3	5	5			
East					1															3	1	5	6		1		
District 7-B	1	1	1	3	2						1		1						1	19	13	6	4				
West				3	4	3	1										1			8	7	7	8	4			
District 9		1	3	1	1														1	15	3	9	11				
District 10							1								1								2	1			
Utah														1							1	1	5	1			
West Virginia																					1						
Wyoming																				2	2	4	5	4	1		
Total United States	**4**	**8**	**7**	**14**	**16**	**7**	**3**	**1**	**1**	**1**	**1**	**3**	**9**	**6**	**3**		**1**		**46**	**112**	**143**	**110**	**151**	**51**	**15**	**8**	**2**
Western Canada		1	2	4		1					1	1		1	1					1	7	13	9	4			
Alberta			2			1						1		1	1						5	3	4	3			
Saskatchewan		1		3							1										2	10	5	1			
Manitoba																				1							
British Columbia				1																							

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.



You can believe it when you see it

When you are faced with the question "Will it make a producer?", the Schlumberger Formation Tester gives the answer.

From the soft sands of the Coastal Areas to the hardrock country of the Mid-Continent, more than 3,000 successful tests have given clear decisions — *each test pin-pointed exactly in the interesting section shown by the log.*

It's a natural combination — a Schlumberger Log that indicates presence of oil followed by a Schlumberger Formation Test that puts oil in your hand.

The Schlumberger Formation Tester provides:

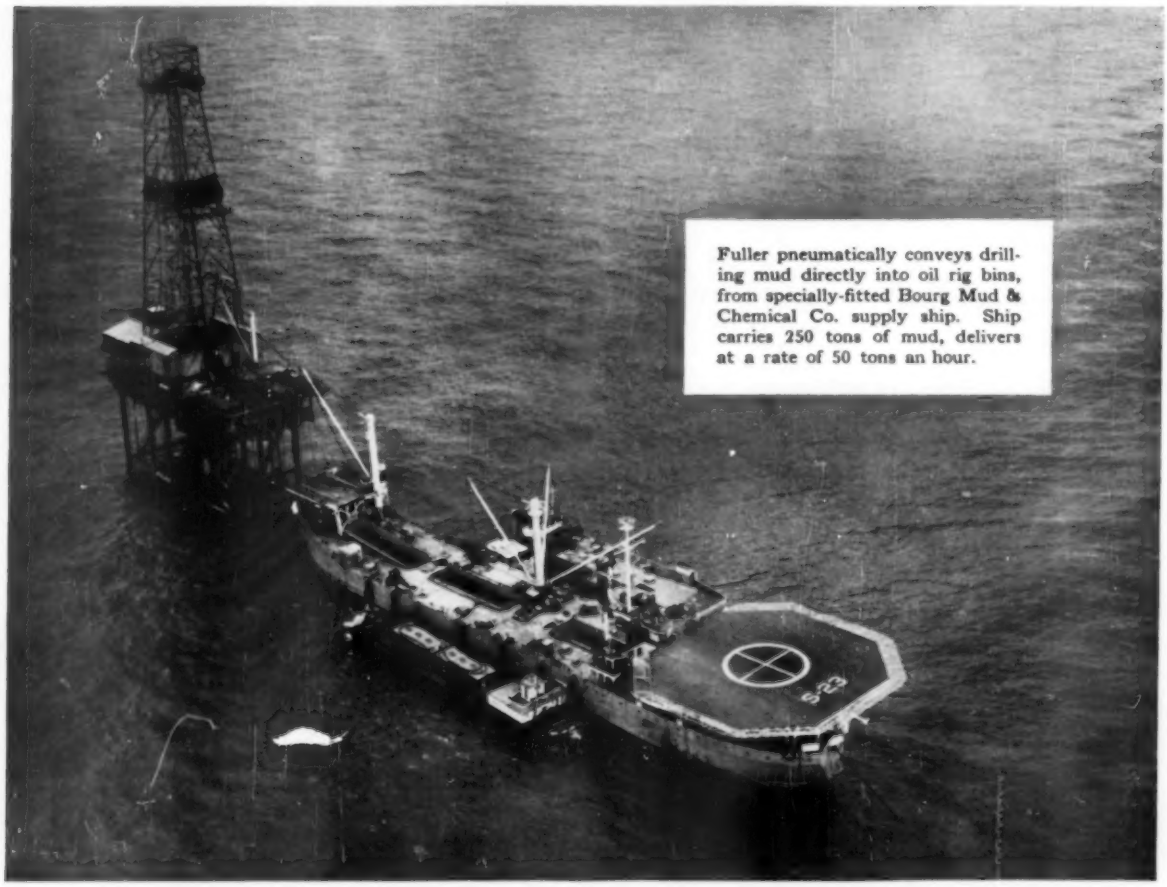
- Fluid Recoveries
- Gas-Oil Ratios
- Gas-Oil and Oil-Water Contact Levels
- Flowing and Shut-In Pressures
- Pressure Build-Up for Formation Pressure and Permeability Studies

It's quick, safe and economical. Ask your Schlumberger Representative for details on the Formation Tester.

THE EYES OF THE OIL INDUSTRY®

SCHLUMBERGER

The Arithmetic of Materials Handling



Fuller pneumatically conveys drilling mud directly into oil rig bins, from specially-fitted Bourg Mud & Chemical Co. supply ship. Ship carries 250 tons of mud, delivers at a rate of 50 tons an hour.

Sea-Going Fuller Pneumatic Conveying System Cuts Time and Cost of Vital Drilling-Mud Deliveries

The Bourg Mud & Chemical Co., Inc., of Lockport, La., is making off-shore deliveries of drilling mud by advanced Fuller pneumatic systems.

The dry mud is automatically pumped aboard oil rigs from a Fuller equipped cargo ship at a rate of 50 tons an hour—one man replacing large crews handling 100-pound sacks in cargo nets. Previously, bag handling in high seas had been either dangerous or impossible. The highly flexible bulk-handling system now operates safely and efficiently at all times.

Self-emptying hoppers designed and built by Delta Tank Manufacturing Company installed into the Bourg ship are fitted with F-H Airslide® fluidizing gravity conveyors. A 6-inch Fuller-Kinyon pump transfers the aerated material to bins aboard the rig — over distances up to 300 feet. Air pressure is supplied by a diesel-driven Fuller single-stage vane-type rotary compressor.

Here is a good example of Fuller's engineering experience and wide range of equipment combining to solve your materials handling problem. If you handle large volumes of cement and barite, why not investigate a simple, efficient Fuller pneumatic conveying system? For details, write or call Fuller today outlining your problem.

1311
P-171

FULLER COMPANY
GENERAL AMERICAN
TRADE MARK

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • San Francisco • Seattle

Fuller
....pioneers in harnessing AIR

How August field wells compared by depths

	OIL WELLS									GAS WELLS									DRY HOLES								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama							5																				
Arkansas	2	37	12	2	2							1		1						4	12	1	3	1			
California	3	2	9	9	8	8	6	5						2					3	2	2	2	3		1		
Colorado				4	8									3						2	1	6	4				
Illinois	8	34	40	1						3									9	18	42						
Indiana	3	7	2																4	18	3						
Kansas		24	52	22	3							6	7	4						16	42	27	2				
Kentucky	20	15	2							2	5	6	3						21	18	5						
Louisiana	6	30	14	1	14	25	30	9		1	3	2		3	1	1			4	8	15	4	17	21	17	12	3
North	4	26	9		7	1				1	3	2		3	1				1	7	14	2	10	2	1		
South	2	4	5	1	5	17	22	9								1				1	1	2	6	13	15	10	3
Offshore					2	7	8												3				1	6	1	2	
Michigan		4	3	2							2								2	2	3						
Mississippi				1	4		5	2															2		2		
Missouri		1																									
Montana		5	5		2	3														1			1				
Nebraska				5	12																	1	12				
New Mexico	1	7	14	26	14	3	5				6	24	9	24	2				2	2	8	2		1	2		
West		2	3	1	8	1					6	23	8	24	2				1	1	2	1					
East	1	5	11	25	6	2	5					1	1						1	1	6	1		1	2		
New York		21									5																
North Dakota			6		2	12	1														4			1			
Ohio	4		32	1						3	3	9	4						15	4	5	2					
Oklahoma	43	74	55	17	17	8	3				4	3	3	7	1				32	32	25	15	13	5	1		
Pennsylvania		32										36		7	3					4	3		2				
Texas	97	160	205	78	110	34	8	2		1	18	22	3	10	2	2			36	60	42	40	41	18	4	1	
District 1	18	7	6	1						1									6	5	1	2					
District 2		2	3	1	5	6						5	1	1	1	1					3	2	2	4			
District 3		3	1	5	5	3	1							1					4	4	6	2	12	2	4		
District 4	1	5	5	4	7						1	6		1						2	1	5	3	6			
East	16	12		6	13	4													1	2	1	2	5	2			
District 7-B	12	35	11	12	4						1	1							14	21	10	11	6				
West	1	15	122	34	60	19	7	2					1	1		1			1	4	10	9	6	2		1	
District 9	49	76	15	14	14									6					10	21	8	7	3				
District 10		5	42	1	2	2					16	10	1		1					1	2		4	2			
Utah					15																		1				
West Virginia		8	4								26	8	9	1						11	4	1					
Wyoming	3	1	7	1	8	3	1					1		2	5				1	1		1	4				
Total United States	**190**	**462**	**462**	**170**	**219**	**96**	**64**	**18**		**10**	**72**	**118**	**38**	**64**	**14**	**3**			**129**	**203**	**216**	**102**	**105**	**47**	**27**	**13**	**3**
Western Canada		6	10	65	57	8					3	5	1	2	2						3	5	5	2			
Alberta		5	6	22	57	8					3	5	1	2	2						3	1	3	2			
Saskatchewan			4	43																		4	2				
Manitoba		1																									
British Columbia																											

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these Debentures. The offer is made only by the Prospectus.

$200,000,000

Standard Oil Company

(an Indiana corporation)

4½% Debentures, due October 1, 1983

Dated October 1, 1958 — *Due October 1, 1983*

Interest payable April 1 and October 1 in Chicago or in New York City

Price 99% and Accrued Interest

Copies of the Prospectus may be obtained in any State from only such of the undersigned as may legally offer these Debentures in compliance with the securities laws of such State.

MORGAN STANLEY & CO.

KUHN, LOEB & CO. — THE FIRST BOSTON CORPORATION — GLORE, FORGAN & CO.

BLYTH & CO., INC. — DREXEL & CO. — EASTMAN DILLON, UNION SECURITIES & CO.

GOLDMAN, SACHS & CO. — HARRIMAN RIPLEY & CO. Incorporated — KIDDER, PEABODY & CO.

LAZARD FRERES & CO. — LEHMAN BROTHERS

MERRILL LYNCH, PIERCE, FENNER & SMITH — SALOMON BROS. & HUTZLER

SMITH, BARNEY & CO. — STONE & WEBSTER SECURITIES CORPORATION

WHITE, WELD & CO. — DEAN WITTER & CO.

September 18, 1958.

This ball foretells increased profits

Actual production records prove—Kennametal* API Balls and Seats stay on the job 3 to 5 times longer than "Super Alloys," and up to 20 times longer than steel. See Kennametal's new high-polish, "crystal finish" seat.

Kennametal Balls and Seats are stocked as replacement parts by most pump manufacturers—available for immediate delivery. Be sure to specify KENNAMETAL. For descriptive leaflet write to KENNAMETAL INC., Latrobe, Pa.

*Trademark

INDUSTRY AND **KENNAMETAL** ...Partners in Progress

72.4 cu. ft. per barrel, 49.2°, TP 4,365 psi., perforations 8,754-69 ft. (Frio). TD 8,760 ft. (New pay and extension in Round Point area.)

DeWitt County: Harkins & Co. and George A. Musselman et al 1 Atkinson, Refugio Amador Sur. (1¼ miles east of Thomaston). IP 71.69 BOPD (net), 1.4% water, 7/64-in., 42.3°, GOR 836 cu. ft. per barrel, TP 570 psi., perfs. 7,990-92 ft. (Wilcox). TD 9,015 ft. (New field.)

Galveston County: Shell Oil Co. 1 State, Tract 139, East Galveston Bay (14 miles northeast of Galveston). Absolute open-flow potential 3,800 M.c.f. daily, GLR 56.9 M.c.f. per barrel, 56.9°, shut-in TP 3,874 psi., perfs. 10,977-90 ft. (middle Frio). TD 13,515 ft. (New field.)

Three Bee Investment Co. and Glen Amn Oil Co. of Texas 1 Ecret Unit 1, W. K. Wilson Sur. (1½ miles southeast of Dickinson). IP 154 BOPD, 9/64-in., 29.2°, TP 1,050 psi., perfs. 9,492-9,502 ft. (Frio). TD 10,008 ft.

Jackson County: Layton Brown Drilling Co., Inc., et al 1 State Tract 229, Carancahua Bay (2 miles northwest of Carancahua). IP 150.22 BOPD, $\frac{8}{64}$-in., 49.7°, GOR 5,487 cu. ft. per barrel, TP 1,875 psi., perfs. 8,550-54 ft. TD 8,716 ft. (New pay in North Appling field.)

Tex-Star Oil & Gas Corp. 1 Simmons, F. F. Wells Sur. (7 miles southeast of Edna). Absolute open-flow potential 5,200 M.c.f. daily, dry gas, shut-in TP 1,760 psi., perfs. 4,251-54 ft. (Catahoula). TD 4,257 ft. (New pay in West Texana field.)

Killam & Hurd 1 Rose & Sample, Peter White Sur. (10 miles north of Edna). IP 122.82 BOPD, ⅛-in., 21.9°, GOR 200 cu. ft. per barrel, TP 255 psi., open hole 2,734-38 ft. (Catahoula). TD 2,738 ft. (New field.)

Midland Investment Co. 1 Edmonis Pressley Estate, Peter White Sur. (10 miles northeast of Edna). Absolute open-flow potential 1,350 M.c.f. daily, dry gas, shut-in TP 1,368 psi., perfs. 3,514-18 ft. (Frio). TD 5,208 ft. (New pay and extension Cordele field.)

Jefferson County: Hunt Oil Co. 1 State, Tract 20-S, Gulf of Mexico (7 miles southwest of Sabine). IP 150 BOPD, ⅛-in., 32°, TP 1,000 psi., perfs. 7,189-93 ft. TD 9,915 ft. (New offshore field.)

WEST CENTRAL TEXAS

Stonewall County: Southern Minerals Corp. 1 Lewis, Sec. 165, Blk. D, H&TC Sur., 3 mi. SW Aspermont. IPP 62 BOPD, 39°-gravity, GOR 81, Canyon reef 5,233-41 ft. TD 6,470 ft.

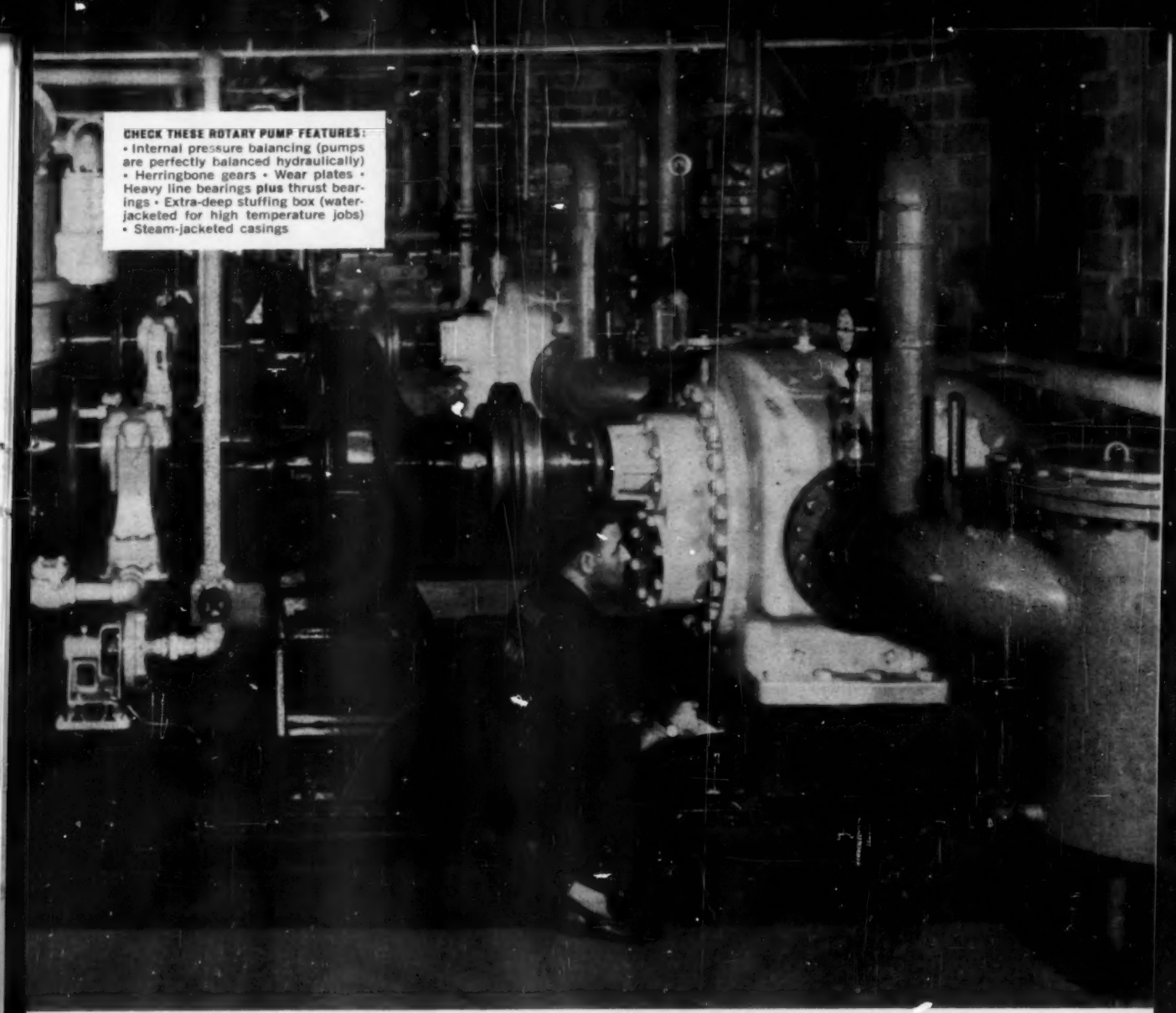
WEST TEXAS

Borden County: Shell Oil Co. 1 Clyde Miller, 527-97-H&TC, 12 mi. NE Gail. IPP 184 BOPD, 40°-gravity, GOR 668, Pennsylvanian 8,074-78 ft. TD 9,210 ft.

Midland County: Cities Service Oil Co. 1 Dora Roberts "D-3," 42-41-T3S-T&P, 19 mi. SW Midland, 2 mi. SW Virey-Ellenburger field. IPP 187 BOPD, 32.8°-gravity, Queen sand pay 4,343-73 ft. TD 9,600 ft.

Reagan County: Ashman & Hilliard 1 Barbee, Sec. 1, CT&MC Sur., in northeastern corner of county, 4 mi. S Garden City. IP 385 BOPD, 16/64-in., 38.6°-gravity, GOR 640, TP 575 psi., Wichita Albany 6,756-80 ft. TD 10,430 ft.

Winkler County: Cities Service Oil Co. 1 Tubb "B," 14-C23-PSL, 3 mi. W Leck field. IP 532 BOPD, 26/64-in., with 3,200 M.c.f. gas, 49°-gravity, Bone Spring 9,742-64, 9,767-76 ft. TD 11,461 ft.


CHECK THESE ROTARY PUMP FEATURES:
• Internal pressure balancing (pumps are perfectly balanced hydraulically) • Herringbone gears • Wear plates • Heavy line bearings plus thrust bearings • Extra-deep stuffing box (water-jacketed for high temperature jobs) • Steam-jacketed casings

THE PUMP THAT PAYS FOR ITSELF

Greater efficiency, power savings make rotaries the pumps to use for medium and high viscosity service.

It's true rotary pumps cost a bit more than centrifugals... about 25% more. But that's purchase price only. You can quickly make up this higher first cost by applying rotaries on jobs they've been designed for. Such jobs are high-capacity oil transfer in tanker loading, gathering, or tank farms. As a matter of fact, you can even save so much the rotary will pay for itself!

True? Of course. Take this typical example. On medium viscosity crude oil, a centrifugal pump might have an efficiency of 50%. A rotary pump performing the same service might have an efficiency as high as 80%, thus requiring *60% less power.* And electric power saving isn't all.

Rotary pumps are self-priming, and operate under very low absolute suction pressure throughout entire viscosity range. This means rotary pumps have low required Net Positive Suction Head (NPSH). They have the same high-speed smooth flow of a centrifugal pump, too, but have positive displacement. That is, they eliminate pulsating flow. And *only Worthington* makes rotary pumps as large as 16 inch suction and discharge. Ask your nearest Worthington representative for the full rotary pump story. Or, if you prefer, write to Worthington Corporation, Section 20-4, Harrison, N. J. In Canada, Worthington, Ltd. Brantford, Ontario.

WORTHINGTON

Blaize Maps Aggressive Plans

TO COMPETE successfully with major oil companies, an independent refiner must keep abreast of the most modern processing trends.

That's the view of Reginald N. Blaize, president of Eastern States Petroleum & Chemical Corp., one of the most successful independents in the business.

A second essential ingredient in the independents success formula, Blaize believes, is a vigorous marketing program.

Eastern States was well endowed with both up-to-date refining facilities and an aggressive, international sales program when Blaize was elected president of the company last May. They had contributed to the tremendous success of Eastern States, especially during the past 5 years when the company was spending millions of dollars to modernize and expand its Houston refinery.

As chief engineer, refinery manager, and later executive vice president of Eastern States, Blaize had played an important role in helping R. B. Kahle, one of the company founders, formulate and carry out the aggressive programs that led to success.

Blaize took over as president of the campany when Kahle moved up from president to chairman of the board. This happened to be in the midst of a long slump for the refining industry, a period in which even major-company refineries were often operating in the red.

Reginald N. Blaize

. . . success formula for independents.

To many in the industry, this seemed to be an ideal time for retrenchment, for cutting costs, and waiting for firmer markets. To Eastern States it was a time not for resting on its laurels, but for planning future expansion which would be needed to meet the intensive competition that lay ahead.

Will expand . . . Blaize announced last week that the company has mapped a future course very much like that it has followed in recent years.

Tentative plans have been drawn for long-range expansion to capitalize on new products, new markets, new opportunities.

Blaize did not specify the extent or nature of the proposed expansion, but he hinted that much of it will be in the chemical and specialty products division. He said many plans are under study. Final decision on the first step has not been made.

Heavy on chemicals . . . Chemicals and solvents now account for about 15% of the company's sales of more than $100,000,000 a year.

Practically all of the company's growth in the chemical field has been within the past 5 years. Today the company makes more than 100 products, including many specialty items in which competition, even from the majors, is slight.

The company's products are now distributed by tank car and truck along the Gulf Coast, by barge to the Chicago area, and by tanker to the East and West Coasts and to terminals in the Netherlands and Italy.

▶ ▶ ▶ Personals

Albert L. Nickerson, president of Socony Mobil Oil Co., Inc., has been elected a director of the American Management Association.

Clyde C. Phillips, vice president, manager of the transmission department, and a director of Ohio Fuel Gas Co., will retire October 1. Phillips joined the company in 1910.

M. R. Smith, petroleum engineer with Gulf Oil Corp., has been transferred to Evansville, Ind., from Oklahoma City. **J. D. Sublett,** petroleum engineer, has been transferred to Evansville from Tulsa.

C. A. Sullins, district drilling and production superintendent at Beeville, Tex., for Union Producing Co., has been named general superintendent of drilling and production. He succeeds **C. A. McDowell,** who will retire November 1. McDowell has been production superintendent since 1953.

D. R. Zachry, Sr., has resigned as executive vice president of American Petrofina Co. of Texas, subsidiary of American Petrofina, Inc. Zachry was executive vice president of American Liberty Oil Co. before it was acquired by Petrofina last year.

Ralph O. Rhoades, senior vice president and a director of Gulf Oil Corp., has been elected executive vice president. He succeeds **David Proctor,** who has been elected chairman of the board, a post that has been vacant since 1957. **George W. Wyckoff,** vice president of T. Mellon & Sons, Pittsburgh, has been elected a director of Gulf. Rhoades has been with Gulf since 1926. A geologist, he has had assignments in South America, the Middle and Far East, and Europe. He became chief staff geologist in 1948, vice president in charge of world-wide exploration and production in 1953, senior vice president in 1955, and a director last year. Proctor was elected vice president, general counsel, and a director of Gulf in 1945. He became executive vice president in 1954.

Roy H. Smith, chief production engineer for Pan American Petroleum Corp., has been named chief petroleum engineer for Pan American International Oil Co. He will move to New York from Tulsa. A graduate of the University of Tulsa, Smith joined Pan Am in 1934.

Alan R. Bailey, senior vice president and a director of Southern Counties Gas Co., has been elected executive vice president. Bailey was named senior vice president in 1956.

Dr. Ralph M. Hill, head of chemicals information in Esso Research & Engineering Co.'s technical information division, has been named a senior research associate. He has been with Esso Research since 1937.

John E. Brewster, former manager of Indiana Oil Purchasing Co.'s Arkansas-Louisiana-Gulf Coast division, has been transferred to Tulsa as manager of the southern division of the executive department, trade and exchange section.

While adding to its specialty products, Eastern States has remained competitive with all majors — and ahead of some—in upgrading its gasoline production. Its Houston refinery, now rated at 60,000 bbl. per day, was one of the first to produce super-premium gas—more than 100 octane.

Background . . . The job of staying abreast in the future rests largely on 46-year-old Blaize who, in addition to being president, is also chief operating officer of the company.

Born in Mississippi December 20, 1911, Blaize studied at Tulane University and later received his bachelor of science in chemical engineering at Louisiana State University.

After graduation, he went to work for Lion Oil Co. as a laboratory assistant at El Dorado, Ark.

In 1940 Blaize joined Eastern States as an engineer. During World War II he became assistant superintendent in charge of operations at the Houston aviation-gasoline plant later acquired by Eastern States from the Government.

He was a consulting engineer from 1945 to 1948, when he returned to Eastern States as chief engineer. A year later he became refinery manager, and in 1950 he moved up to executive vice president, the position he held until his election to the presidency.

Gerald McGrew, manager of Cities Service Oil Co.'s crude-oil supply division, has been elected a vice president. McGrew joined the company in 1940 as a valuation engineer. A graduate of the University of Kansas, he had been manager of crude-oil supply and a director of the company since 1955.

Dr. Plinio Gamboa, geologist with The Texas Co. in Caracas, is leaving the company to do surface geology for the Venezuelan Ministry of Mines.

F. G. (Frank) Bollo has succeeded **Robert G. Larsen** as director of research at Shell Oil Co.'s Martinez, Calif., refinery research laboratory. Larsen has been named manager of the Shell Petroleum Co., Ltd., Thornton research center near Chester, England.

H. F. Couzy, group head A in the oil inspection and knock laboratory at Lago Oil & Transport Co.'s Aruba refinery, Netherlands Antilles, has been named director of laboratories there. He succeeds **D. P. Barnes,** who has retired. **R. K. Ballard,** group head B in oil inspection and knock, will succeed Couzy. **J. F. Reynolds,** senior chemist, will replace Ballard.

Bill McKay, production superintendent in Aurora Gasoline Co.'s crude-oil division, has been transferred to Pratt, Kans., from Carmi, Ill. In Pratt he succeeds **Leonard Olds,** who has been transferred to Aurora's general offices in Detroit. **David Heinz,** geologist, has also transferred to Detroit from Wichita.

R. E. McMillen, formerly chief geophysicist of Midstates Oil Corp., and four officers of Geo Prospectors, Inc.—**H. M. Thralls, T. S. Green, W. B. Perry,** and **A. M. House**—have formed a new partnership, McMillen, Thralls, Green, Perry & House. The company will primarily do geophysical consulting in foreign areas. It will manage activities of Geo Prospecteurs de France, which was formed earlier this year.

M. L. Hagan has been named Tulsa division manager for American Climax Petroleum Corp. succeeding **L. L. Brundred,** who is retiring October 1. Hagan is production superintendent in charge of water-flood operations in Texas, Oklahoma, and Kentucky for the company. He was with Whitehill Oil Corp. before its purchase in 1955 by American Metal Climax, Inc., parent company of American Climax Petroleum. Brundred organized the company's Tulsa division and has been its manager since 1954. He will open consulting offices in Tulsa after retirement.

H. R. Segnar, Phillips Petroleum Co.'s southeast regional geologist in Bartlesville, Okla., has been promoted to manager of the Oklahoma City land and geological division. He succeeds **I. J. Pierce,** who has resigned to join Reading & Bates Offshore Drilling Co. as manager of land and exploration. Segnar will be succeeded in Bartlesville by **B. C. Phillips,** Houston division geologist. **R. J. Kaus,** Casper, Wyo., district exploration geologist, has been transferred to Bartlesville as southwest regional geologist. He replaces **J. R. Leonard,** who has resigned. **H. W. Price,** reservoir geologist in Bartlesville, has moved to Amarillo, Tex., as assistant division exploration geologist.

▶▶▶ Personals

H. E. Boomer, assistant field superintendent of gathering lines for Natural Gas Pipeline Co. of America, has been named superintendent of pipelines for Texas Illinois Natural Gas Pipeline Co., an affiliate. He will headquarter in Chicago. Boomer succeeds **Keith Bentz,** who was recently elected assistant vice president of operations. **Dale A. Schafersman,** superintendent of Natural Gas Storage Co.'s Herscher, Ill., station, has been promoted to field superintendent of compressor stations for Texas Illinois. He

BOOMER

SCHAFERSMAN

will headquarter in Malvern, Ark. Schafersman succeeds **Don T. Lutz, Jr.,** recently named director of employe and public relations in Chicago. **Burman F. Olson,** formerly assistant superintendent for Natural Gas Pipeline at Stinnett, Tex., will succeed Schafersman. In other changes, **William P. Lincoln,** station superintendent at Truro, Iowa, will replace Olson at Stinnett. **C. J. Fitzgerald,** station superintendent at Minneola, Kans., replaces Lincoln. **Marion E. Shelor,** plant engineer at the Minneola station, moves up to replace Fitzgerald there. Also, **Robert D. Means,** operations engineer in the Chicago office, has been transferred to Marshall, Tex., as superintendent of Texas Illinois' station there. He succeeds **Robert R. Dixon,** who has resigned. **George R. Brindle,** district measurement engineer at Hooker, Okla., has been appointed district superintendent of gas measurement for Natural Gas Pipeline at Fritch, Tex. He succeeds **C. L. Mouck,** who has retired.

K. D. Bowen, vice president and general manager of Texas Butadiene & Chemical Corp., Houston, has resigned to devote full time to private business. Bowen joined Texas Butadiene in 1955.

Robert C. Shields, West Texas division reservoir engineer for The Texas Co., has been promoted to reservoir engineer on the general manager's staff in Houston. He was formerly in Fort Worth.

Personals

Oscar Keesee, formerly division manager for Midstates Oil Corp., has joined Jocelyn-Varn Oil Co., Wichita, as general manager. Jocelyn-Varn currently has production in Kansas, Oklahoma, and Texas, and has scheduled a $5 million exploration and development program in 1959. Keesee was with Shell Oil Co. and Magnolia Petroleum Co. before joining Midstates.

R. N. Walker, Tennessee Gas Transmission Co.'s Bellaire, Tex., district production superintendent, has been transferred to the new Durango, Colo., district in the same capacity. **R. M. Stephens,** chief petroleum engineer, will succeed Walker in Bellaire. **H. E. Rowe, Jr.,** Mid-Continent division petroleum engineer, becomes chief petroleum engineer. **P. H. Lenhart,** Great Bend, Kans., district petroleum engineer, succeeds Rowe, and **L. W. Rogers,** petroleum engineer in Oklahoma City, replaces Lenhart. Also going to Durango are **J. J. Lacey,** petroleum engineer in Wichita Falls, Tex., now district petroleum engineer in Durango, and **Claude B. Kirby, Jr.,** Wichita, Kans., district geologist.

In the company's new Shreveport, La., district, **D. P. Dampf,** former Hobbs, N. M., district superintendent, has been named district production superintendent. **DeWitt Coffey,** Oklahoma City district production foreman, succeeds Dampf at Hobbs. **H. O. Stallings,** senior petroleum engineer, becomes district petroleum engineer in Shreveport. **Marty A. O'Brien,** Corpus Christi, Tex., district landman, moves up to district exploration manager in Shreveport. In a third new district, **N. B. Venus,** district exploration manager in Salt Lake City, moves to the new Jackson, Miss., district in the same capacity. **R. B. Ross,** district geologist, moves to Jackson from Bellaire.

In Houston, **J. F. Mayfield,** former Gulf Coast division petroleum engineer, has been named equipment engineer. **W. T. Wells, Jr.,** Wichita Falls district petroleum engineer, succeeds Mayfield on the Gulf Coast. **E. L. Freund,** petroleum engineer in Houston, becomes district petroleum engineer in Wichita Falls. **Donald I. Gahagan,** staff geologist in Houston, becomes Bellaire district exploration manager.

In other changes, **W. H. Medary,** Roswell, N. M., district geologist, becomes district exploration manager at Midland. **Robert M. Grace** moves from Salt Lake City to Midland as district geologist. **J. D. Giles,** district landman in Oklahoma City, becomes district exploration manager there. **Beryl D. Carey,** geologist in Casper, Wyo., becomes district geologist there. **Donald L. Hellar,** Wichita district manager, has been named Wichita Falls district exploration manager.

E. K. Brill, assistant to the vice president of Continental Oil Co., has been elected a vice president. He will continue to headquarter in New York. Brill has been with Conoco since 1930. He was Rocky Mountain region exploration manager, assistant general manager of the southern region in Houston, and central region general manager in Oklahoma City before moving to New York last year.

J. P. Rinde, formerly general partner in Moriqui Exploration Co., **A. C. Skillington,** formerly with Hancock Oil Co., and **Jack E. Peeves,** formerly with Standard Oil Co. of California, have formed Rinde Oil Co. in Los Angeles.

R. Dean Grimm, Northern Natural Gas Co.'s manager of gas reserves and availability and underground storage, has been promoted to manager of the gas-supply department. He will supervise gas purchases, purchase gas operations, reserves, availability, and underground storage. A graduate of Missouri School of Mines, Grimm joined Northern in 1955.

Louis R. Sterrett, station foreman in Corinth, Miss., for Gulf Interstate Gas Co., has been promoted to section superintendent in Rayne, La.

Fred C. Koch, chairman of Koch Engineering Co., Inc., Wichita, has been elected a director of Universal Oil Products Co.

John Redmond, geologist with Ohio Oil Co., has been transferred to Calgary after a 2-year assignment with Oasis Oil Co. of Libya.

Paul R. Haas, administrative vice president of Texas Eastern Transmission Corp., and **Guy T. Henry,** president of Providence Gas Co., have been elected directors of Algonquin Gas Transmission Co., Boston.

Gen. Ernest O. Thompson of the Texas Railroad Commission will receive the John Franklin Carll award at the October 5-8 meeting of AIME's Society of Petroleum Engineers. The award, presented for the first time last year, recognizes outstanding achievement in petroleum engineering. Thompson will be cited for his contributions to public acceptance of reservoir engineering principles in conservation regulation and practice. Thompson has been a member of the Railroad Commission since 1932. He was one of the founders and has served three times as chairman of the Interstate Oil Compact Commission.

Deaths

Robert B. Thompson, 32, an engineer in the research department of Shell Oil Co. in New York, was among the passengers killed when a commuter train fell through an open lift bridge into Newark Bay.

Thomas R. Weymouth, 82, retired vice president of Columbia Gas System and a pioneer in the natural-gas industry, died September 23 in New York. Weymouth was the inventor of the Weymouth formula for determining the flow of gas through a pipeline. He was also a pioneer in development of the orifice meter for large-scale measurement of natural gas. A former president of Iroquois Gas Corp. and Oklahoma Natural Gas Co., he was recipient of the Charles A. Munroe award of American Gas Association in 1941. The award recognizes outstanding contributions to the gas industry.

Harley R. Johnson, 65, owner and president of Akin Gasoline Co., Tulsa, died September 20 in a Tulsa hospital. Johnson joined Keener Gasoline Co. and its subsidiary, Akin Gasoline, in 1918. He bought Akin Gasoline in 1948.

Theodore C. Foster, 51, owner of T. C. Foster Pipe Pulling Co., Cushing, Okla., died September 21 in New York.

Gasoline stock cuts—where and when

BY JOHN C. CASPER

REFINERY OPERATIONS this year produced the largest cut in gasoline stocks since the end of World War 2, and yet reductions were too small.

Total gasoline inventories amounted to 218,705,000 bbl. at the end of last March. That total represented gains of 12,000,000 bbl. over 1957, 19,000,000 bbl. over 1956, and almost 35,000,000 bbl. over 1955.

The big stock accumulation at the start of the gasoline season this year was out of proportion to this year's prospective gain in demand. Total gasoline demand since the end of March has shown a gain of a little less than 1.0% compared with last year. Stocks were up almost 6.0% at the start of the season.

Some districts were influenced more than others by the big stock surplus. Correction patterns also have varied by districts. These changes are shown on the chart.

Points on the chart represent index numbers with average March stocks for the years 1954-57 equal to 100. Since these basic March totals are represented by the number 100, the points also show percentage change from base figures.

District 4, the Rocky Mountain area, has had fewer gasoline problems this year than other districts, and therefore was not included in the chart data. Suppliers in this district started with reasonable stocks in March and have had good reductions during the motoring season.

Stock reductions in Districts 1 and 5 have been similar this year. Note that the lines for these districts are very close for the whole gasoline season.

Inventories were high at the start of the season and reductions were very regular up to the middle of September. Stocks in District 5 were up 21% from the reference base at the start of the season. On September 12, West Coast stocks were only 5% below the March 31 stock average for the reference period. Read 121 and 95 for the two ends of the District 5 line.

Compared with the March base, District 1 stocks were up a little over 16% at the start of the season and had dropped only to 4% under by September 12.

Curves for Districts 2 and 3 follow a pattern but with some variations. Note that stocks dropped rapidly in the first half of the driving season but tended to level off early in July.

District 3 inventories were cut 12,400,000 bbl. from March 28 to July 4 but actually increased slightly between that date and September 12. Stocks in District 2 decreased 12,700,000 bbl. by July 18 and then leveled off.

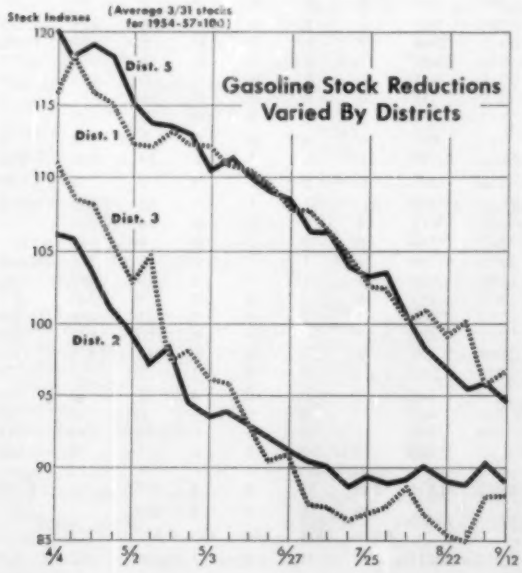
District 2 had the smallest percentage decrease for the season, down only 16.4%. But, this district was in better position at the start of the season than other areas except for District 4.

Note on the chart the starting positions for the districts. Here is the lineup. District 2 stocks were only 6.3% above the average March 31 inventories for the 1954-57 period. District 3 was up 11.3%. District 1 was up 16.3%. And, District 5 was up 20.7%.

Market changes . . . Group 3 residual for northern movement is up about 10 cents a barrel. Formal quotations for resid on the Gulf Coast are down 25 cents. Spot prices are off 15 to East Coast are clouded by confusion 20 cents. Heavy-fuel prices on the of cuts and discounts. Cuts range near 25-30 cents.

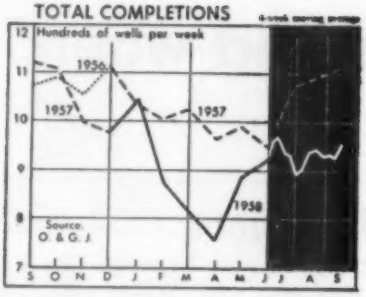
A quick look at the highlights . . .

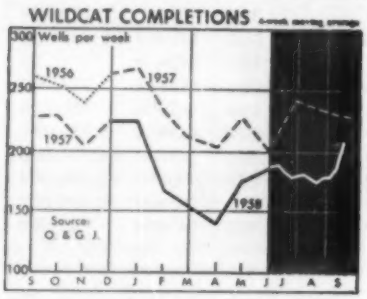
	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,105,425	UP	71,375	UP	195,729
Crude stocks	240,716,000	DOWN	2,592,000	DOWN	42,449,000
Completions	1,063	UP	101	DOWN	23
Refinery runs	7,604,000	DOWN	241,000	DOWN	226,000
Gasoline stocks	173,158,000	UP	267,000	DOWN	900,000
Kerosine stocks	30,011,000	UP	363,000	DOWN	6,179,000
Distillate stocks	149,461,000	UP	3,271,000	DOWN	16,301,000
Residual stocks	68,893,000	UP	515,000	UP	12,890,000
Four-product stocks	421,523,000	UP	4,416,000	DOWN	10,490,000
Total imports	1,460,300	UP	183,800	DOWN	41,600



THESE LINES represent gasoline stock changes for this year's motoring season by districts. Weekly stocks for each district are compared with average March 31 inventories for years 1954-57.

DRILLING





Active Rotary Rigs*

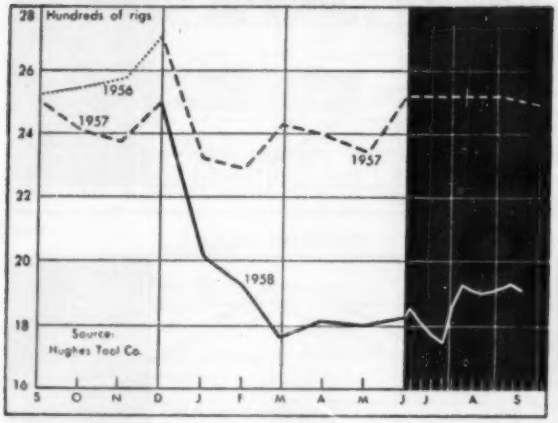
	9-22-58	9-15-58	9-23-57
Alabama	6	5	4
Arkansas	25	23	26
Arizona	2	2	1
California	75	75	97
Colorado	38	35	69
Florida	1	1	1
Georgia			
Idaho			
Illinois	53	62	71
Indiana	8	6	8
Iowa	3	3	2
Kansas	147	156	148
Kentucky	10	8	10
Louisiana	311	310	450
North	35	38	63
South	238	235	292
Offshore	38	37	95
Maryland			1
Michigan	12	10	11
Missouri	1	1	
Montana	20	20	33
Mississippi	45	46	40
Nebraska	26	25	34
Nevada			
New Mexico	100	95	155
New York	2	2	
North Dakota	34	32	40
Ohio	1	1	
Oklahoma	209	223	266
Oregon			1
Pennsylvania	9	9	13
South Dakota	3	3	
Texas	669	681	887
South-Gulf	129	141	195
Offshore	1	1	3
North-East	171	174	(†)
West Central	210	210	(†)
West	158	155	(†)
Tennessee			1
Utah	29	31	64
Washington	1		1
West Virginia	3	2	4
Wyoming	66	69	73
Virginia			1
Total U. S.	1,909	1,936	2,512
Western Canada	146	153	201
Eastern Canada	4	4	3
Grand total	2,059	2,093	2,716

*Hughes Tool Co. †Comparisons not available due to change in method of reporting.

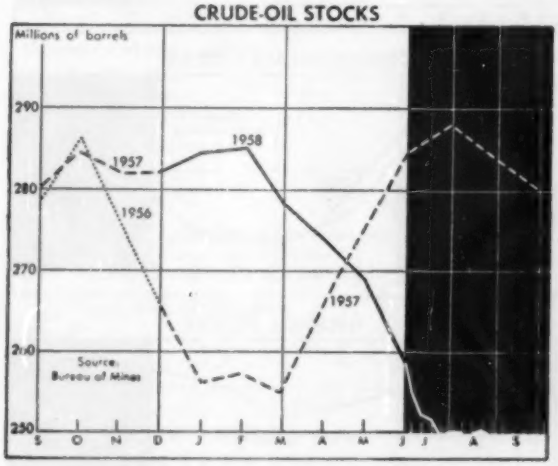
WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 20, 1958

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	4	4	0	0	0	0	46,135	55	64	0	0	0	0	0	20	20
Arkansas	27	18	0	2	7	0	74,930	549	807	2	0	0	0	2	116	146
California	28	16	0	0	12	0	136,209	1,147	1,566	11	0	0	0	11	274	378
Colorado	26	6	0	6	14	0	132,854	587	618	13	2	0	0	11	340	412
Illinois	90	39	0	0	51	0	218,415	1,584	1,879	19	1	0	0	18	321	469
Indiana	28	11	0	0	17	0	45,639	550	463	10	3	0	0	7	196	92
Kansas	78	37	0	7	33	1	269,302	2,698	3,034	15	3	0	0	12	571	607
Kentucky	40	16	0	2	22	0	58,537	843	1,057	8	2	0	0	6	109	219
Louisiana	81	37	6	7	31	0	516,604	2,472	2,762	12	1	0	0	11	359	487
North	41	16	0	7	18	0	121,754	905	986	7	0	0	0	7	149	132
South	35	18	5	0	12	0	346,012	1,246	1,276	3	0	0	0	3	188	295
Offshore	5	3	1	0	1	0	48,838	321	500	2	1	0	0	1	22	60
Michigan	7	4	0	1	2	0	18,877	298	309	1	0	0	1	0	97	110
Mississippi	8	3	1	0	4	0	70,565	277	282	3	1	0	0	2	126	146
Montana	13	6	0	0	6	1	37,785	245	299	3	0	0	0	3	99	117
Nebraska	10	3	0	0	7	0	65,086	504	631	7	1	0	0	6	237	350
New Mexico	42	20	1	11	10	0	181,089	1,411	1,548	9	1	0	0	8	194	206
West	25	7	1	11	6	0	106,947	684	635	5	0	0	0	5	81	77
East	17	13	0	0	4	0	74,142	727	913	4	1	0	0	3	113	129
New York	10	5	0	0	0	5	13,500	401	335	0	0	0	0	0	37	6
North Dakota	6	4	0	0	2	0	28,471	332	194	2	1	0	0	1	108	87
Ohio	0	0	0	0	0	0	0	742	805	0	0	0	0	0	12	9
Oklahoma	147	72	4	4	42	25	431,485	4,604	4,519	19	6	2	1	10	630	524
Pennsylvania	0	0	0	0	0	0	0	438	473	0	0	0	0	0	14	39
Texas	368	183	11	27	140	7	1,529,237	12,930	15,818	100	11	3	2	84	2,660	3,822
District 1	30	10	0	0	20	0	60,101	704	912	14	0	0	0	14	284	313
District 2	19	3	5	1	10	0	132,022	547	554	6	0	0	0	6	145	202
District 3	23	10	3	1	9	0	134,998	932	1,254	9	1	2	0	6	211	359
District 4	26	9	1	2	14	0	100,411	864	1,029	11	1	0	0	10	257	342
East	25	14	0	0	11	0	125,002	879	959	9	0	0	0	9	245	277
District 7-B	47	27	0	0	19	1	155,436	1,757	2,088	13	1	0	0	12	496	728
West	85	61	2	1	18	3	464,402	3,707	4,480	17	6	1	0	10	523	641
District 9	82	37	0	5	37	3	228,985	2,609	3,498	18	2	0	0	16	422	881
District 10	31	12	0	17	2	0	127,880	931	1,044	3	0	0	2	1	77	79
Utah	3	1	0	0	2	0	28,855	279	149	2	0	0	0	2	61	77
West Virginia	13	1	0	10	2	0	30,589	515	483	0	0	0	0	0	12	22
Wyoming	32	12	0	3	17	0	137,812	548	612	11	0	0	0	11	164	210
Misc. (Fla., S. D.)	2	0	0	0	2	0	8,459	69	109	2	0	0	0	2	59	92
Total U. S.	1,063	498	23	80	423	39	4,080,435	34,078	38,816	249	33	5	4	207	6,816	8,647
Prev. week	962	437	15	90	385	35	3,683,612	.....	.....	199	18	5	3	173	.....	.....
Cum. 1958	34,078	16,684	829	2,609	13,066	890	141,049,481	.....	.....	6,816	671	118	195	5,832	.....	.....
Western Canada	40	21	0	1	13	5	181,478	1,757	2,215	11	1	0	1	9	475	624

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	9-13-58	9-6-58	9-14-57
Pennsylvania	2,853	2,887	3,185
Other Appalachian	1,379	1,408	1,769
Illinois, Indiana, Michigan	10,098	10,806	11,305
Nebraska and North Dakota	2,230	1,971	2,489
Kansas	9,289	9,033	10,146
Oklahoma	15,821	16,077	21,695
Arkansas	1,872	1,912	2,699
Louisiana	15,001	15,871	19,400
North	2,722	2,685	3,300
South	12,279	13,186	16,100
Mississippi, Alabama, Florida	2,765	2,539	2,696
New Mexico	8,005	8,092	9,824
Texas	100,686	99,769	125,824
East Texas	7,668	7,856	10,199
West Texas	49,982	49,062	61,313
Texas Gulf	17,988	17,867	23,933
Other Texas	25,048	24,984	30,379
Wyoming	13,104	13,445	16,817
Other Rocky Mountain	9,127	9,041	6,474
California	35,047	35,952	30,463
Foreign	†13,439	14,505	17,310
Total	**240,716**	243,308	282,096

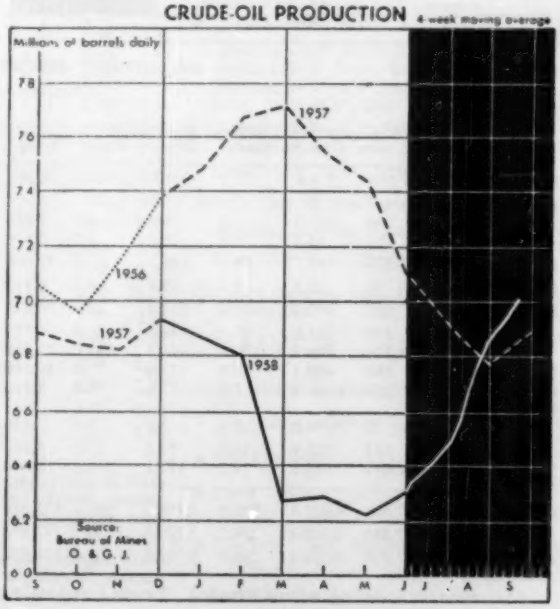
*Bureau of Mines. †Includes 5,115,000 bbl. in California.

DAILY AVERAGE PRODUCTION FOR WEEK

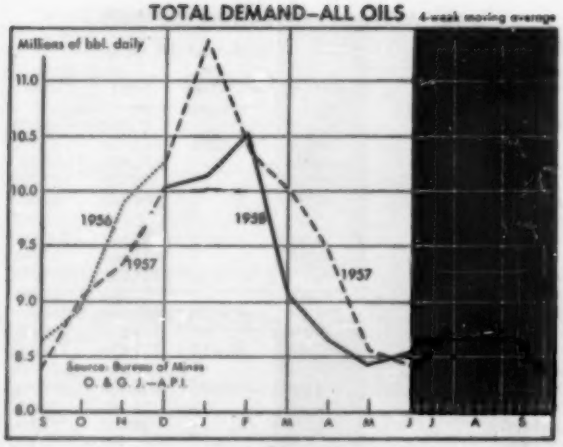
	September 20, 1958			
	Crude oil	Lease condensate	Total	Sept. 13 total
Alabama	15,000	.....	15,000	14,950
Arkansas	73,550	200	73,750	73,650
California	851,800	.....	851,800	853,200
Colorado	130,700	.....	130,700	132,000
Eastern	46,100	.....	46,100	45,000
Florida	1,225	.....	1,225	1,225
Illinois	229,500	.....	229,500	223,000
Indiana	32,800	.....	32,800	32,500
Kansas	†344,075	.....	†344,075	†309,750
Kentucky	41,000	.....	41,000	41,000
Louisiana	796,250	86,150	882,400	882,400
North	106,250	2,700	108,950	108,950
South	690,000	83,450	773,450	773,450
Michigan	26,200	.....	26,200	25,100
Mississippi	102,900	3,800	106,700	106,700
Montana	77,100	.....	77,100	76,800
Nebraska	58,000	.....	58,000	57,800
Nevada	100	.....	100	100
New Mexico	274,000	5,100	279,100	279,100
North Dakota	29,600	.....	29,600	33,500
Oklahoma	†568,100	.....	†568,100	†526,200
Texas	2,827,000	63,500	2,890,500	2,890,500
Dist. 1	48,000	500	48,500	48,500
Dist. 2	128,000	8,300	136,300	136,300
Dist. 3	374,000	31,500	405,500	405,500
Dist. 4	213,000	8,100	221,100	221,100
Dist. 5	34,000	375	34,375	34,375
Dist. 6	130,000	6,100	136,100	136,100
East Texas field	166,000	.....	166,000	166,000
Dist. 7-B	155,000	75	155,075	155,075
Dist. 7-C	145,000	4,050	149,050	149,050
Dist. 8	1,115,000	2,000	1,117,000	1,117,000
Dist. 9	212,000	1,500	213,500	213,500
Dist. 10	107,000	1,000	108,000	108,000
Utah	97,400	.....	97,400	102,600
Wyoming	324,100	.....	324,100	326,800
Others	‡175	.....	‡175	‡175
Total U. S.	6,946,675	158,750	**7,105,425**	7,034,050
Change from previous week, up			**71,375**	
Canada	†459,200	.....	†459,200	†369,600
Total U. S. production, January 1-September 20			1,723,122,100 bbl.	
Same period last year (crude plus cond.)			*1,916,600,969 bbl.	

*Includes 36,740,425 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

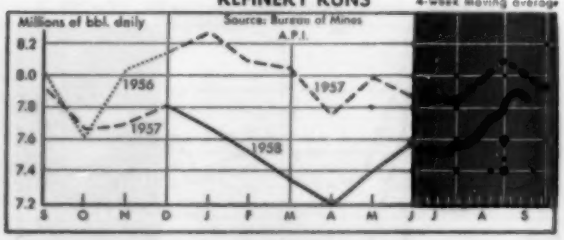
CRUDE-OIL PRODUCTION 4-week moving average



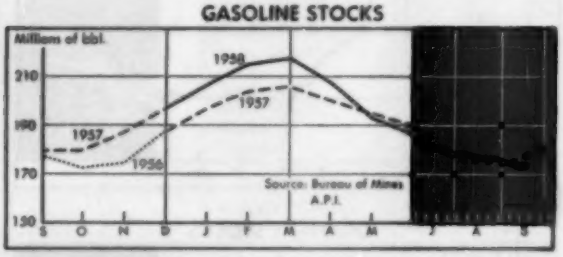
TOTAL DEMAND—ALL OILS 4-week moving average



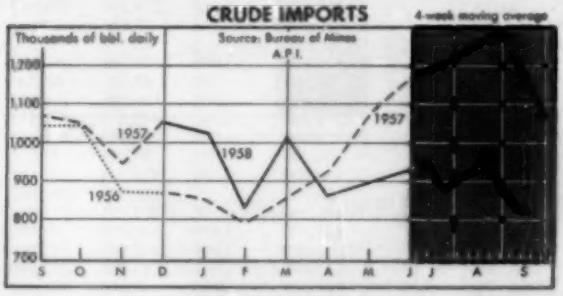
REFINERY RUNS 4-week moving average



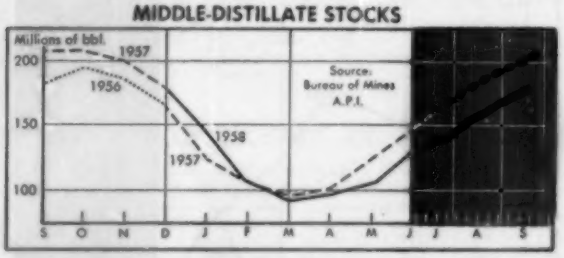
GASOLINE STOCKS



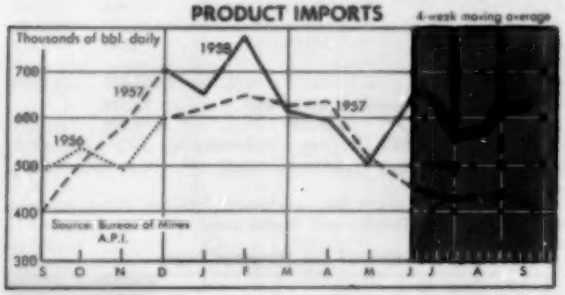
CRUDE IMPORTS 4-week moving average



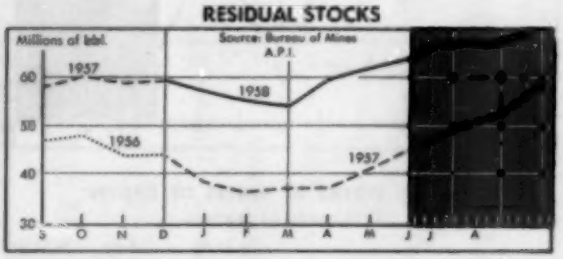
MIDDLE-DISTILLATE STOCKS



PRODUCT IMPORTS 4-week moving average



RESIDUAL STOCKS



API REFINERY REPORT, SEPTEMBER 19, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, September 1957 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,164	536.0	15.4	316.0	250.4	38,899	11,345	52,501	13,130	1,170	513.8	20.7	308.1	193.9
Appalachian:														
District 1	104	45.0	5.0	20.3	6.3	4,244	592	3,334	368	108	47.2	2.3	25.1	6.5
District 2	103	54.3	6.0	20.2	7.7	2,344	443	1,463	207	101	53.4	6.0	16.8	9.6
Ind., Ill., Ky.	1,270	694.7	48.7	286.3	97.3	32,866	7,640	26,882	5,663	1,408	729.5	63.0	290.3	162.3
Minn., Wis., Dak.	70	29.8	1.3	19.4	9.0	6,915	1,505	8,227	545	61	25.1	1.6	20.2	7.0
Okla., Kans., Mo.	687	392.3	14.0	164.9	18.3	16,870	1,836	13,231	1,048	704	413.9	13.3	173.6	30.9
Inland Texas	276	195.0	13.3	48.4	20.0	6,527	389	2,044	1,998	283	215.9	7.4	52.1	22.7
Texas Gulf Coast	1,770	929.3	106.3	464.4	187.0	22,158	2,902	15,284	8,889	1,891	985.3	111.0	451.0	228.7
La. Gulf Coast	665	408.1	55.4	157.6	52.8	10,186	2,026	6,959	1,734	612	368.2	35.2	168.9	49.8
N. La. and Ark.	100	41.3	5.6	23.6	6.9	4,712	617	2,223	174	99	38.0	7.4	18.9	6.7
Rocky Mountain:														
New Mexico	20	14.6	0.6	3.0	1.1	431	15	116	45	25	13.9	0.4	5.2	3.3
Other Rky. Mt.	284	125.9	10.0	57.4	27.0	4,412	338	3,074	853	290	133.1	3.9	65.6	39.2
West Coast	1,091	535.1	4.3	177.1	301.3	22,594	363	14,123	34,239	1,168	525.0	3.9	176.3	338.9
Sept. 19, 1958	7,604	4,001.4	285.9	1,758.6	985.1	173,158	30,011	149,461	68,893	7,920	4,062.3	276.1	1,772.1	1,099.5
Sept. 12, 1958	7,845	4,008.0	298.3	1,775.0	969.7	172,891	29,648	146,190	68,378	.....	.....	.....	.....	.....
Sept. 20, 1957	7,830	4,030.3	298.7	1,715.3	1,118.4	174,058	36,190	165,752	56,003	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.75-12.25
Premium (99 octane)	14.75-15.25
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-10.75
Regular (92 octane)	10.75-11.00
Premium (97 octane)	11.875-12.125
Premium (98 octane)	12.00-12.25
California (rack) (Los Angeles):	
Regular (86 octane)	11.3-11.5
Premium (96 octane)	12.8-13.0
Premium (98 octane)	13.3-13.5
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (97 octane)	12.125

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.75-10.00
Diesel oil (58 d.i. and above)	9.50-9.75
Distillate No. 1	9.50-9.75
Distillate No. 2	8.75-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.875
Distillate No. 2	8.625
New York Harbor (barges):	
Kerosine 41-43	9.95
Distillate No. 2	9.45
Diesel fuel, 48-52 d.i.	10.05
Caribbean area (cargoes):	
Distillate No. 2	8.625

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank car	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max. 1% S)	$1.40-1.50
Gulf Coast (cargoes):	
★ Bunker C fuel	$2.00-2.10
New York Harbor (barges):	
★ Bunker C fuel	$2.29-2.45
Caribbean (cargoes):	
★ Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.45

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.§	Mid-Cont.*	Gulf Coast Tex..†	West Tex.‡ N.M.	Wyo. (sour)
14-14.9	$2.36	....	....	....	....
15-15.9	2.41	....	....	....	$1.81
16-16.9	2.46	....	....	....	1.86
17-17.9	2.51	....	....	....	1.91
18-18.9	2.57	....	....	....	1.96
19-19.9	2.62	....	....	....	2.01
20-20.9	2.68	$2.75	....	$2.62	2.06
21-21.9	2.73	2.77	....	2.64	2.11
22-22.9	2.78	2.79	....	2.66	2.16
23-23.9	2.84	2.81	$3.44	2.68	2.21
24-24.9	2.89	2.83	3.46	2.70	2.26
25-25.9	2.95	2.85	3.48	2.72	2.31
26-26.9	3.00	2.87	3.50	2.74	2.36
27-27.9	3.06	2.89	3.52	2.76	2.49
28-28.9	3.11	2.91	3.54	2.78	2.54
29-29.9	3.16	2.93	3.56	2.80	2.59
30-30.9	3.22	2.95	....	2.82	2.63
31-31.9	3.27	2.97	....	2.84	2.67
32-32.9	3.33	2.99	....	2.86	2.71
33-33.9	3.38	3.01	....	2.88	2.75
34-34.9	3.44	3.03	....	2.90	2.79
35-35.9	....	3.05	....	2.92	2.83
36-36.9	....	3.07	....	2.94	2.87
37-37.9	....	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40-44.9	....	3.15	....	3.02	2.95

*Includes Oklahoma (sweet), part of Kansas, North Dakota, West Texas (sweet). †Low cold test crude. ‡Sour. §Some postings 3-11 cents lower.

Effective dates of broad changes: California, 6-22-58; east of California, January 3-10, 1957; Pennsylvania Grade, 6-18-58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Ville Platte	3.30
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	3.90
Middle District	3.72
Southwest Pennsylvania	3.43
West Virginia	3.25
Buckeye Grade	3.25
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.67
Redwater (Alta.)	2.56
Smiley (Sask.)	2.33
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26°-26.9°, Amuay*	2.55
Quiriquire, 16.0°-16.4°, Caripito	2.15
Lagunillas heavy, flat, Amuay or Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.93

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
Iraq, 36.0°-36.9°, Tripoli, Banias	2.49
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., dirty (USMC—5%)	$2.71
★ Carib.-U.S.N.H., dirty (ATRS —45%)	1.51
★ P.G.-U.K., dirty (Scale—50%) (30s. 2d.)	4.23
Gulf-East Coast, clean (USMC Flat)	2.85

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SACRIFICE SALE: Three seismograph drills; two Mayhew 1000 Combinations and one Franks Combination. Also three water trucks and three pickups; drill pipe, subs, tools. Contact H. S. Smith, Box 845, Seminole, Texas; phone PLaza 8-2232.

USED ROTARY DRILLING EQUIPMENT. Rigs, drill pipe, drill collars and accessory equipment. Inquiries appreciated. Harries Sales & Rentals, P. O. Box 1568, Odessa, Texas.

SWABBING UNIT FOR SALE: hydraulic operated 37' tubular derrick, Wilson Senior Winch w/5000' ⅝" line, powered by Ford Industrial, mounted on 1950 Ford F-6; complete w/lubricator, valve, etc., ready to swab—$3,500.00. Box K-875, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

SECOND HAND Mining Equipment, 2 air receivers, compressor 6x7, 13 H.P. gas engine, air hammer, 60 pieces of ⅞ steel, pipes, bolts, valves, belts, fittings, 2 cyclone tilting furnaces, and other equipment. See at 2222 N. Fair Oaks, Altadena, Calif., SY 7-5089.

1—C-250 NATIONAL IDEAL 7¼" x 15" power slush pump driven by General Motors 12103 twin diesel engine. 3—Superior Super P.T.D.-6S diesel drilling engines with twin disc clutches & radiators. O'Neal Taylor & Company, 6102 Harrisburg, Houston, Texas.

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Phone RAymond 3-3357

EQUIPMENT WANTED

WANT TO BUY good Mayhew 2000 or Failing 2500 rig. Give details, including price and where rig may be inspected. Box K-857, The Oil and Gas Journal, Tulsa, Oklahoma.

WE ARE INTERESTED in purchasing a D-6 Caterpillar or equivalent with side boom. Cat. to be in good operating condition. Write to Roy Gearhart, Box 710, McPherson, Kansas, or telephone 481 at McPherson.

TRAILER MOUNTED drilling rig capable of 3,000' drilling with 3½" pipe. Must be in good condition. Send full particulars first letter, price, location, condition & other pertinent data. Box K-881, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

COMBINATION general manager, drilling superintendent and petroleum engineer, to supervise foreign one rig operation; top salary and bonus. We want complete background and references. All replies held strictly confidential. Box K-867, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ASSISTANT DISTRICT FOREMAN—Supervision of high pressure gas transmission pipeline construction, maintenance and operation. Engineering background desired with three to five years experience in pipeline work, including supervisory responsibilities. Position offers excellent opportunity for advancement to higher management. Location New England. Send resume of education, experience and salary expected. Box K-848, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs, $5.00 cash. OIML Co., Box 2603, Tulsa, Okla.

REPRESENTATIVE to sell Oil Tool Equipment to drilling companies and refineries. Good territories available. Experienced representatives preferred. Box 31J402, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif.

GENERAL SALES MANAGER wanted by aggressive petroleum marketing company with headquarters in Tulsa. Must be experienced in sales promotion, well known in the industry and have full knowledge of specifications of petroleum products as well as pricing schedules. Some traveling necessary. Excellent opportunity with chances for advancement for right man. Please reply Box K-855, The Oil and Gas Journal, Tulsa, Oklahoma, giving age, qualifications, references and expected starting salary. All replies will be treated strictly confidential.

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Must have operating and administrative experience. Chemical or petroleum engineering background helpful. All replies confidential. Salary open. West Coast refinery.

Box 31J404,
The Oil and Gas Journal,
4041 MARLTON AVENUE,
LOS ANGELES 8, CALIF.

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BY INDEPENDENT PRODUCER

Job entails supervision of drilling wells, completion of same and routine production operations and requires experience in eliminating and reducing field costs. Job also includes finding and installing waterfloods and substantial experience in this is essential. Office in Tulsa and be in field approximately 50% and office 50%. Salary and incentive plan.

BOX K-869,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

SITUATION WANTED

PRODUCTION SUPERINTENDENT: Age 41. Experience 20 years, all phases production, drilling, completion and maintenance, desires position with Independent Company. Excellent references. Will consider any location. Box K-878, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-LAWYER — wide experience federal oil, gas problems Washington, D. C., seeks to represent oil company in Washington. Box K-856, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—35, registered, seven years production engineering Gulf Coast, West Texas, and Mid-Continent. Desires work in production and/or completion with small, active organization. Box K-860, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

PETROLEUM GEOLOGIST - ENGINEER, 28, four years Rocky Mountain experience in exploration, development. Presently employed. Desires position with aggressive independent or consulting firm in Denver, Colorado. Box K-871, The Oil and Gas Journal, Tulsa, Oklahoma.

ANALYZER ENGINEER: ME, PE, age 31. 4 years experience in corrosion field, 2 years experience in applying plant stream analyzers and data handling equipment at a large refinery. Desire a technical/supervisory position in the advanced instrumentation field. Box K-873, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT: Man in early fifties with more than 30 years practical experience in Production and Drilling with major companies desires connection with small, growing Company or Independent Producer. Many years deep and shallow well gas lift and pumping experience. Excellent physical condition. Will consider any location. Box K-859, The Oil and Gas Journal, Tulsa, Oklahoma.

MANAGER OF DRILLING COMPANY and former operations Manager for oil company, desires challenging position. 24 years foreign and domestic experience. Box K-866, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED Petroleum Engineer: B.S., 33, 7 years experience: production, waterflooding unitization, evaluation. Box K-864, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST - GEOPHYSICIST, 30, B.A. Math, M.S. Geology, 6 years interpretative experience with major, desires position with consulting or small oil firm with exploration department. Detailed resume on request. Box K-830, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION ENGINEER—28, single, 3 years gulf experience including offshore. Work experience includes single and multiple completions, production, drilling, workovers, equipment, and general engineering. Two years roughnecking and roust-about prior to gaining above experience. Box K-879, The Oil and Gas Journal, Tulsa, Oklahoma.

SENIOR CLERK—With Executive Ability, Desires To Relocate. Widely Experienced In All Phases Of Drilling, Production, Sales, Measurement, Warehousing And Office Management. Experience Gained Thru 12 Years With 3 Major Companies. Married, Age 33, Good Record And References. Box K-880, The Oil and Gas Journal, Tulsa, Oklahoma.

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PERSONALS

PAN AMERICAN CONSULTANTS, a newly formed partnership specializing in oil and gas development in Latin America has opened offices in the Maryland Casualty Building in New Orleans, and the Ambar Motor Building in Havana, Cuba. The partnership is composed of John F. Bricker, Management; Fernando Freyre, Legal; James R. Crow, Geological.

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TO BE SOLD SOON, privately or publicly, N½, Sec. 3, Twp. 19 N, R 1 W of I M, Payne Co., Okla. Part of estate of Eugene B. Hickman. On Highway 86, 8 mi. south of Perry, 13 west and 4 north of Stillwater. Lake Carl Blackwell borders at points on south. 90 acres cultivated. Conveniently located well has produced plenty of water for 50 years. Never drilled on for oil or gas. Old, producing wells within sight. Write Loren Moore, Executor, 811 S. Ash, Ottawa, Kansas.

LEASE AND DRILLING BLOCKS

WANTED—Oil & Gas Royalties for Investment. Commonwealth Trust Co. P. O. Box 350, Wilmington 99, Delaware.

FOR SALE—10,000 plus acres, 2 to 5 years oil leases in Breckinridge County, Kentucky. Will sell or deal for an over-ride. P. O. Box 187, Hardinsburg, Ky.

500 ACRE DRILLING BLOCK, Pawnee County, Oklahoma. Nearby production. Box K-858, The Oil and Gas Journal, Tulsa, Oklahoma.

SHALLOW KENTUCKY drilling deals, some in Green County. H. A. Miller, Glasgow, Kentucky.

FOR SALE: New 10 year term, 300 acre oil and gas lease, L. C. Estes Survey, Shelby County, Texas, hot play. $5.00 per acre. Write C. A. Parker, Box 507, Center, Texas.

AVAILABLE FOR working this season on good terms. Federal land leases, Northeast Wyo. and Southeast Utah. Contact D. M. Cooper, 35 East Woodbury, Altadena, Calif.

CUBAN COMPANY controlling 3½ million acres of petroleum rights desires to contact U. S. or Canadian Corporation interested in Cuba's oil future. Maps and data available to the right party. Write to M. A. Noguera, 23rd #53 St. Vedado, Havana, Cuba.

OWN TWO BLOCKS Central Texas. Exceptional geology. Primarily gas, with oil possibilities good. New gas market. Pay approx. three thousand feet. Will sell interest each block with exploratory wells. P. O. Box 11145, Fort Worth 10, Texas.

640 ACRE UTAH oil and gas lease for sale by owner. Section 9, T11S, R22E, Uintah County. Will sell with or without overriding royalty. Make offer. Box K-874, The Oil and Gas Journal, Tulsa, Oklahoma.

OVERRIDING ROYALTY—One sixteenth —in 120 A. lse. with 9 producing wells, San Andres long-life pay. Has averaged over $1,000.00 year for past 7 years. Has 3 inside undrilled locations. Good flood project. Excellent company operation. Box K-877, The Oil and Gas Journal, Tulsa, Oklahoma.

ALASKA

Cook Inlet Basin, West Foreland Area: 20,000 acres. 1/8th override. $15.00 per lease acre.
Copper River Basin: 2,560 acres. 1/8th override. $1.00 per lease acre.
Kandik Area: 20,000 acres. 1/8th override. $1.00 per acre.

LLOYD E. HONSINGER.
1702 Twining Avenue, Anchorage, Alaska

MAPS

WE HAVE AVAILABLE the most accurate oil maps and information for those interested in Cuba's oil developments. Write to M. A. Noguera, P. O. 336, Havana, Cuba.

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NUMEROUS TERRITORIES now open for sales and service organizations to represent us in a complete line of production equipment. Our line of equipment fits in well with practically all production equipment service organizations. Commissions far above average. Box K-863, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR QUICK SALE, working interest for $375 per ⅛ to drill shallow gas and oil well on 80 acre lease located between two producing pools with drill locations staked on well defined gas and oil structure. Estimated gas over two million cubic ft. per day, and a good gamble for large or small investors. Write Lewis Snavely, Geologist, Box 315, Coweta, Oklahoma.

PRODUCTION WANTED

PRINCIPAL with unlimited funds seeks settled primary production and/or secondary recovery prospects. Box K-876, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Oil properties, 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

PRINCIPALS with unlimited funds seek any-sized oil-gas production. Give details; strict confidence. Box K-774, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL

SEALED BIDS will be received until 10:00 A.M., Mountain Standard Time, October 22, 1958, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for oil and gas leases on 85 tracts of allotted lands, totaling approximately 13,551 acres, located in McKinley, San Juan and Sandoval Counties, New Mexico.

Details of the lease offering and filing of bids may be obtained by addressing an inquiry to the General Superintendent, Navajo Indian Agency, attention: Branch of Realty, Window Rock, Arizona.
Sale #59.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Denver, Colorado. Notice is hereby given that 149.69 acres of land in two parcels within the known geologic structure of Moffat Field, Moffat County, Colorado, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 2 p. m., M.S.T., November 5, 1958, when bids will be opened. Details of the lease offering, how and where to submit bids, and forms, may be obtained from the Bureau's Land Office, P. O. Box 1018, Denver, Colorado. John L. Rankin, Manager.

LEGAL

SEALED BIDS will be received until 10:00 A.M., Mountain Standard Time, October 14, 1958, and opened at that time in the office of the Superintendent of the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 162 tracts of Tribal land comprising 7,982.53 acres and 26,197.28 acres of individually owned trust or restricted Indian lands located in Roosevelt, Sheridan and Daniels Counties, Montana, for oil and gas mining purposes.

The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone, Poplar, PO 8-3441.

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—— *Industry* briefs

Lutah Uranium & Oil, Inc., has purchased interest in 35 producing wells with 40 direct offset locations in Oklahoma, Texas, and Kansas from Jocelyn-Varn Oil Co., Wichita, Kans. The transaction involved 8,170 acres. Total oil production is 330 bbl. daily.

First section of the 695-ft. keel of a new Sun Oil Co. supertanker has been laid at Sun Shipbuilding & Dry Dock Co. at Chester, Pa. The $13-million ship will be 47,750 deadweight tons and have a cargo capacity of 372,300 bbl. It will be completed in late 1959 or early 1960.

Anchor Petroleum Co., Tulsa, has acquired controlling interest in Petrolane Gas Co. and subsidiaries, New Orleans. Anchor is a nation-wide marketer of LPG and petroleum products. Petrolane is a distributor of LPG in Louisiana, Mississippi, and Alabama.

A contract to construct a carbon monoxide-fired boiler at Gulf Oil Corp.'s Port Arthur, Tex., refinery has been let to Babcock & Wilcox Co. The boiler will recover 400 million B.t.u.'s per hour from the high-temperature gases produced by a fluid catalytic-cracking unit. The boiler is expected to go on stream in late summer of 1959.

Anlin Co. will build a plant which will recover 150 tons daily of sulfur from hydrogen sulfide supplied by Shell Oil Co.'s Wood River, Ill., refinery. The plant will be located adjacent to the refinery.

West Maygill Gas & Oil, Ltd., Calgary, has changed its name to Ranger Oil (Canada), Ltd. The company's U. S. subsidiary, Ranger Oil Co., retains its same name.

Nominations for Alberta crude in October show a slight increase over September figures.

Nominations filed with the Alberta Oil and Gas Conservation Board total 289,157 bbl. daily, an increase of 1,757 bbl.

U. S. nominations dropped by 2,900 bbl. daily to a total of 20,600 bbl. U. S. refiners submitting nominations were General Petroleum Corp., Ferndale, Wash., 11,500 bbl.; International Refineries, Wrenshall, Minn., 3,100 bbl.; Bay Refining Corp., Bay City, Mich., 3,000 bbl.; and Lake Superior Refining Co., Superior, Wis., 3,000 bbl.

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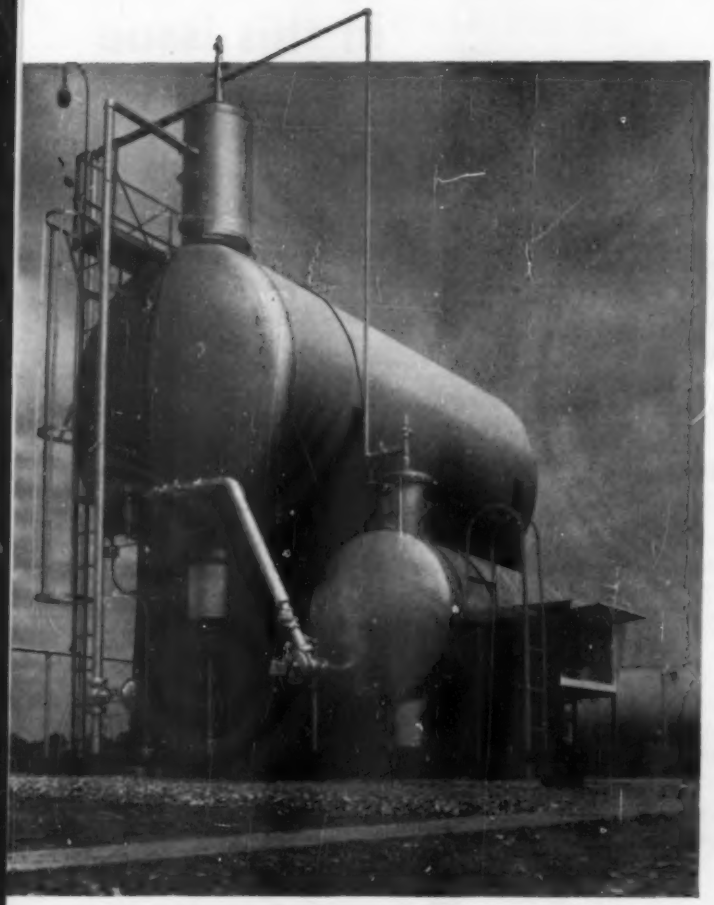
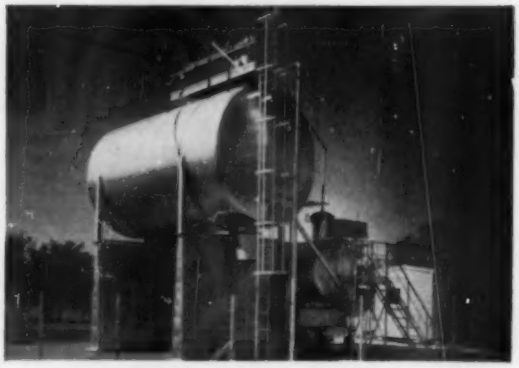


Texas Gulf Coast—60 barrel metering tank with 400 barrel storage tank; storage tank has an oil and gas separator mounted on its inlet and is equipped with level diverting valves and hi-lo shut down controls.



Southern Oklahoma—60 barrel metering tank with 444 barrel storage tank; in operation since March of 1956; delivering oil to the pipeline on an automatic basis since November of 1956.

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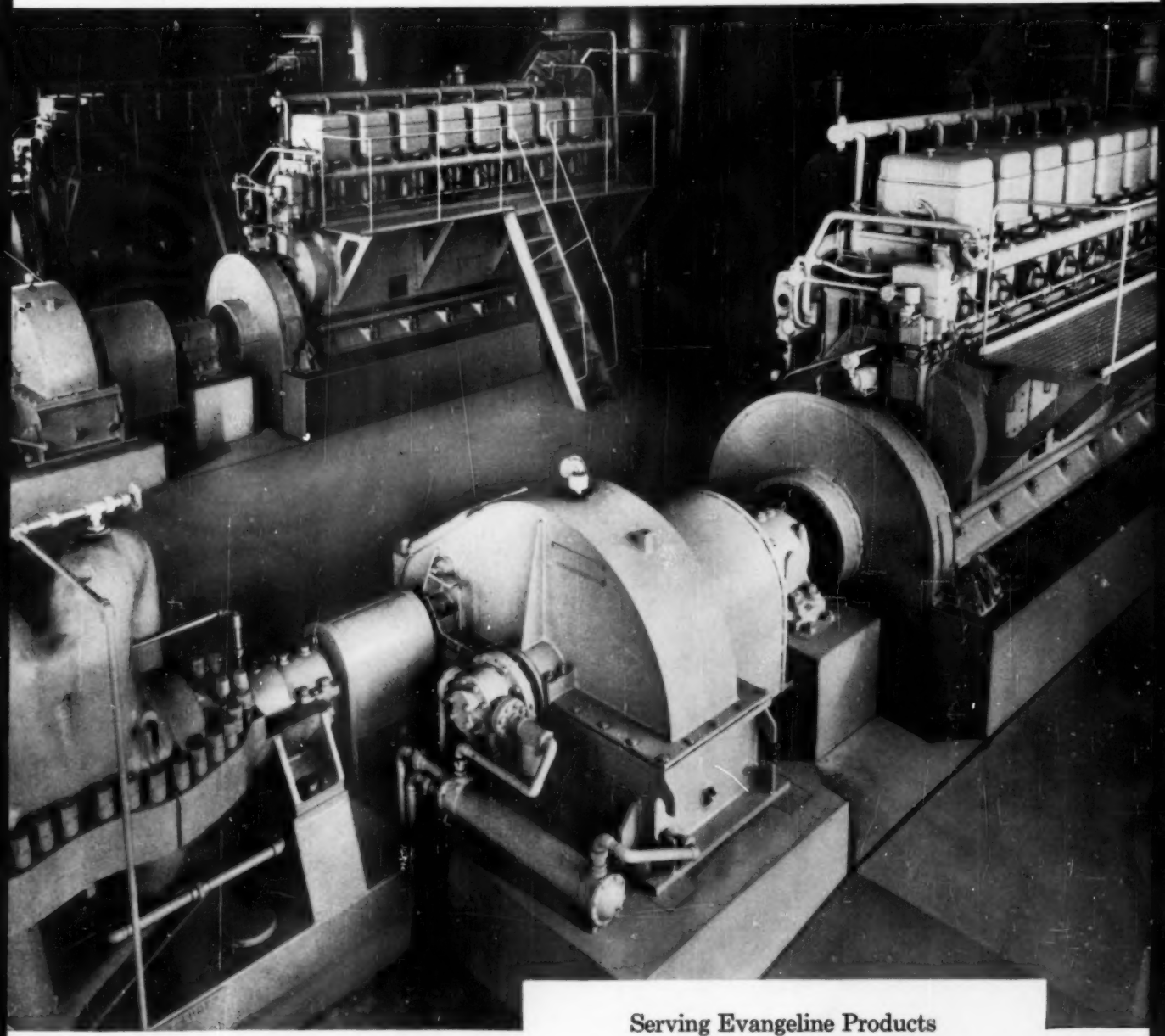

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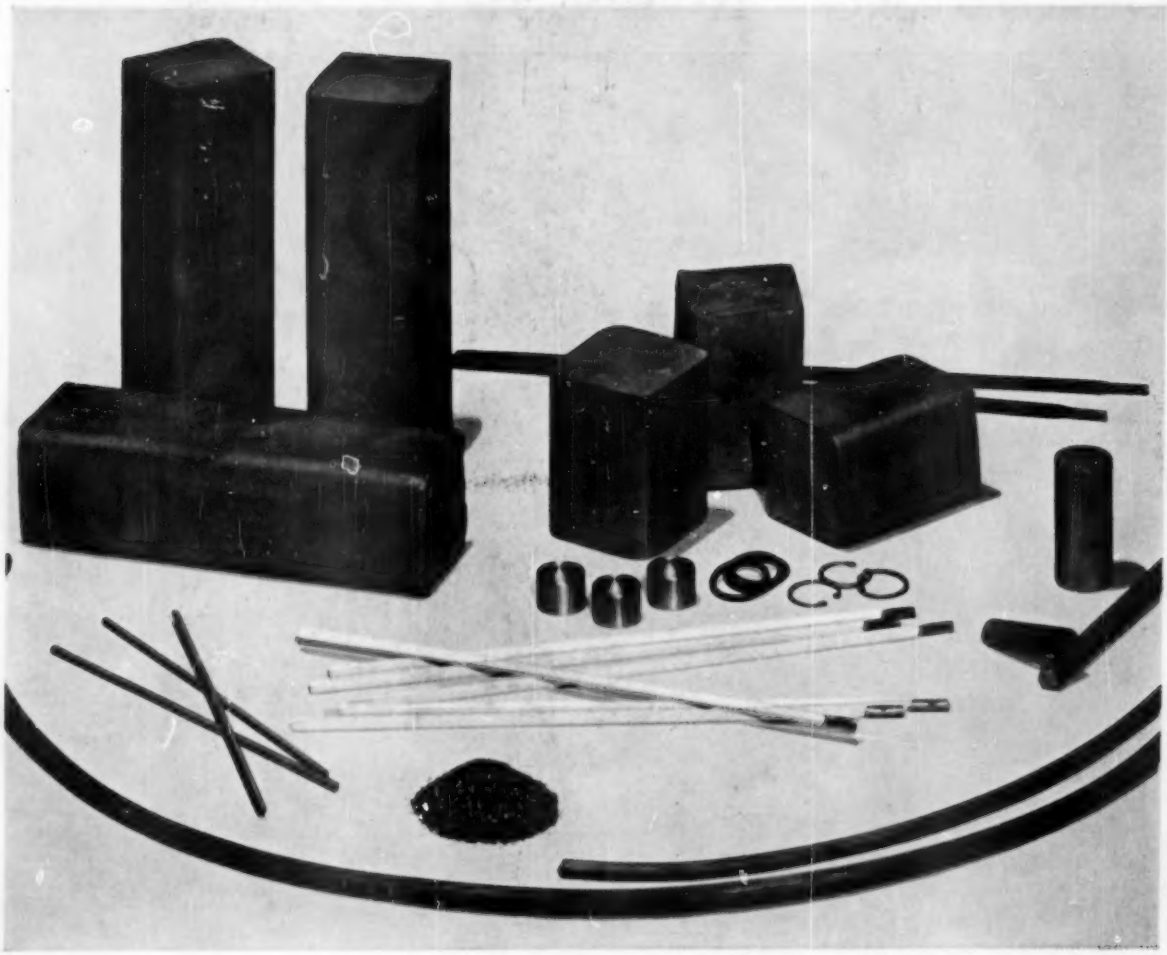

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